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* General studies, see also individual crops.

Plant Breeding Abstracts.

Vol. XII, No. 3.

Part I. Empire Section.

STATISTICS 519

635. FISHER, R. A. 519.24

The asymptotic approach to Behrens's integral, with further tables for the *d* test of significance.

Ann. Eugen. 1941 : **11** : 141–72.

If the experimenter wishes to test whether the difference between the two means from two samples is "real" or "significant", he will in most cases be able to use Student's *t*-test, now well known to a wide circle of experimenters. Strictly this test should only be used if the variabilities in the two samples are not "too different", or more precisely if they do not indicate any differences in the respective variabilities of the data of which the two samples are random representatives. If these variabilities, that is the variances of the two populations from which the two samples are drawn, *differ* in a *known* ratio a simple modification in the calculation of *t* again allows the application of the *t*-distribution. The case where the experimenter has no knowledge about the variances is more difficult and has given rise to heated controversies in which practically all theoretical statisticians have joined. The present paper deals with this case and consists of two parts. The first is concerned with a derivation of the author's test (the *d*-test, previously given by W. V. Behrens, Landw. Jb. **68** : 807–37 in a different form) by means of the logic of "simultaneous fiducial distributions", which is also due to the author. In the second part the author gives a new table of the probability integral of *d* and its percentage points (less accurate and less complete tables of the probability integral had previously been computed by P. V. Sukhatme (Sankhyā: Indian J. Statist. 1938 : **4** : 39–48). The arithmetical method used is a double series expansion in powers of $\frac{1}{n_1}$ and $\frac{1}{n_2}$ (where n_1 and n_2 are the degrees of freedom of the two samples) and results in tables of the "Distribution of errors compounded of components distributed in normal and Student's distribution." The process is illustrated by admirable diagrams. H. O. H.

636. THOMPSON, C. M. 519.24

Table of percentage points of the χ^2 distribution.

Biometrika 1941 : **32** : 187–91.

This table gives new percentage points for the χ^2 test of significance, well known from its applications to curve fitting and analysis of four-fold tables and similar classifications of observed frequencies. The new percentage points are: 0·5%, 2·5%, 25%, 75%, 97·5% and 99·5% points of significance. Moreover, from the present table values of χ^2 up to 100 degrees of freedom may be obtained. Tables previously published only extend to 30 degrees of freedom and advocate certain approximations for degrees of freedom beyond 30. These approximations, whilst fairly accurate for degrees of freedom of 100 or more are not satisfactory between 30 and 100. The new table therefore represents an improvement in the accuracy of the percentage points of χ^2 which is also indicated by the higher decimal accuracy given in the body of the table. H. O. H.

637. THOMPSON, C. M. 519.24

Tables of percentage points of the incomplete beta-function.

Biometrika 1941 : **32** : 151–81.

These tables are related to the tables of percentage points of F (variance ratio) and also to R. A. Fisher's well known z-tables which are required in an analysis of variance. In the present table another transformation of the above statistics is used and the quantity tabulated is known to theoreticians as the argument x of the Incomplete Beta-Function. The relation between F and x is given by $F = \frac{n_2(1-x)}{n_1 x}$ and since in these tables, x is given to 5-decimal accuracy, they provide values of F (or z) to an accuracy which is higher than that given in any table hitherto published. A number of new percentage points are given, namely the 25%, the 10%, the 5% and 0·5% points. H. O. H.

638. STEVENS, W. L. 519.24:575.24
Accuracy of mutation rates.
J. Genet. 1942 : **43** : 301–07.
The use of the standard error of small proportions such as mutation rates is shown to be highly erroneous. A table is given for calculating the exact tests of significance of small proportions.
H. W. H.

639. FINNEY, D. J. 519.271.3
The joint distribution of various ratios based on a common error mean square.
Ann. Eugen. 1941 : **11** : 136–40.
In modern factorial designs a large number of treatments are often tested simultaneously and the analysis of variance presents the problem of deciding which of the large number of treatment mean squares indicates a real effect of the treatment. The danger of applying the *z*-test injudiciously in such cases has frequently been pointed out (see e.g. "Plant Breeding Abstracts", Vol. VIII, Abst. 1013). Bias may be introduced through selecting the largest mean square from a homogeneous set of random ones. Thus of twenty "dummy-effects" the largest would be expected to be returned as "significant" if tested by the original *z*-test. The appropriate small sample test requires that all mean squares in the set be divided by the error mean square in the analysis of variance, and the largest ratio thus obtained tested. An approximate test was discussed by Hartley (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 22). The author gives an exact algebraic expression for the random sampling distribution required for the test if all treatment mean squares have the same number of degrees of freedom. Numerical results are given for the simplest cases, but in general the evaluation of the percentage points would be laborious.
H. O. H.

BREEDING 575

640. BURNS, W. 575:582(54)
Some ideas and opportunities for plant geneticists in India.
Indian J. Genet. Pl. Breed. 1941 : **1** : 1–3.
The author discusses briefly the question of work by geneticists in the field of taxonomy, both of wild plants and of crop plants in India.

641. DEB, N. 575:633(54.1)
What's doing in All-India—Bengal.
Indian Fmg 1942 : **3** : 91–93.
Includes information on tests made at the Sugar Cane Testing Station, Dacca; on tobacco selection at the Dacca Farm, and on experiments with rice and certain fibre plants.

642. DAS, C. M. 575:633(54.3)
What's doing in All-India—United Provinces.
Indian Fmg 1942 : **3** : 94–96.
Data are supplied on work in progress in regard to fruit variety trials, wilt resistance in *Gossypium* species, and sowing-time and manurial trials for wheat and barley varieties.

643. KHAN, M. A. 575:633(54.5)
What's doing in All-India—The Punjab.
Indian Fmg 1941 : **11** : 590–94.
Descriptions are given of improved varieties of wheat (including Pb. C 518), of cotton (including 119 Sanguineum) and of oleiferous Brassicae (toria, sarson, raya and taramira).

644. KAMAT, M. N. 575:633(54.7)
Progress of plant pathological research in Bombay.
Poona Agric. Coll. Mag. 1941 : **33** : 97–100.
Work of the Section during the last fifteen years is briefly reviewed.
A special technique for the selection and testing of wilt-resistant types of *Gossypium* suitable for cultivation in the cotton-growing areas of the province is described. It is claimed that the method has resulted in the production of 100% wilt-resistant types.
Similar research is in progress with species of *Lathyrus*, *Cajanus*, *Crotalaria* and *Musa*, and on the development of varieties of *Triticum* resistant to black rust.

645. COSTER, C. 575:633(92)
The work of the West-Java Research Institute, Buitenzorg, 1938–41.
Emp. J. Exp. Agric. 1942 : **10** : 22–30.

The West-Java Research Institute is a private institution serving all the tea plantations of the Netherlands Indies, cinchona cultivations to the extent of over 17,000 ha., and the rubber plantations of the western half of Java and South and West Sumatra. Plant selection is among the work carried out by the institute.

646. MATHER, K. 575:633:575–18
Genetics and the Russian controversy.
Nature, Lond. 1942 : **149** : 427–30.

The author agrees with Lysenko that genetics has not contributed very much to the improvement of crops and stock and suggests that this is due to geneticists neglecting the study of polygenic characters. The neglect of polygenetics is attributed to the early controversy between the Mendelians and the biometricians, to technical difficulties in the analysis of polygenic segregations and to geneticists being interested in other subjects such as linkage (from 1910 onwards), X-ray mutations (from 1927 onwards), Darlington's re-casting of cytology in an inductive-deductive form in the early 1930's, giant salivary gland chromosomes in *Drosophila* (significance of these being understood in 1934) and Beadle and Ephrussi's investigations on gene action in 1935. It is suggested that the rejection of the whole of genetical theory is useless and that an extension of experimental research on polygenetic inheritance will enlarge genetical theory so that it will be of real value to breeders. H. W. H.

647. MATHER, K. 575–18:575.116
The balance of polygenic combinations.
J. Genet. 1942 : **43** : 309–36.

A further paper (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 252) on selection of *Drosophila melanogaster* lines for abdominal hair number. It is suggested that the results show that balancing of polygenic combinations may occur in any chromosome, that a large change can occur under the action of selection as a result of unbalancing the polygenes in a small segment of chromosome, and that re-ordering of the genes may occur in a chromosome in such a way that the effects of individual segments are changed while the effect of the chromosome as a whole remains nearly constant. H. W. H.

GENETICS 575.1

648. ETHERINGTON, I. M. H. 575.1:001.4
Non-associative algebra and the symbolism of genetics.
Proc. Roy. Soc. Edinb. 1941 : B **61** : 24–42.

A genetical population may be characterized by the frequency-distributions of its genes, zygotes and mating couples from which new distributions referring to their progeny may be derived. These frequency distributions of the new generations are often obtained from the parental distributions by a process known as random mating. This process is usually denoted by the symbol of multiplication (x) placed between the two parental populations. The author goes fully into the meaning of this symbolism and shows that the frequencies of the new generations can indeed be derived from the parental frequencies through repeated formal multiplication. However, the ordinary rules of algebra are not applicable, for the progenies Px(QxR) and (PxQ)xR are not identical. Different types of algebra (known to mathematicians as linear algebras) have to be developed to conform to the rules of the various modes of inheritance. The result may be termed a shorthand symbolism of genetical theory of inheritance which should prove a useful tool in the development of hypotheses. H. O. H.

CYTOLOGY 576.3

649. BARBER, H. N. 576.354.4:581.04
The experimental control of chromosome pairing in *Fritillaria*.
J. Genet. 1942 : **43** : 359–74.

The effect of both high temperatures and colchicine on meiosis in *Fritillaria Meleagris*, a species showing pronounced proximal localization of chiasmata, was to reduce the chiasma frequency. Heat treatment produced an increased proximal localization of chiasmata but colchicine destroyed to some extent the proximal localization. This action of colchicine is probably due to its specific inhibitory effect on the centromere. Colchicine treatment also produced frequent interlocking. H. W. H.

650. FABERGÉ, A. C. 576.354.46
Homologous chromosome pairing : the physical problem.
J. Genet. 1942 : **43** : 121–44.

Homologous pairing of chromosomes is discussed in its physical aspects. A physical hypothesis to explain homologous pairing is put forward, making use of the Guyot–Bjerknes effect, a hydrodynamical phenomenon which results from the operation of Bernoulli's theorem.

651. LEWIS, D. 577.8:576.312.332
The evolution of sex in flowering plants.
Biol. Rev. 1942 : **17** : 46–67.

After discussing the distribution of hermaphrodite, monoecious and dioecious species in the different families, this review deals with the synthesis of dioecious strains, the synthesis of male sterility, the analysis of sexuality, the analysis of sex chromosomes, and the analysis of sex and selection. It is pointed out that there are only two cases where the female is the heterogametic sex as compared with many where the male is and it is suggested that sex mechanisms where the female is the hybrid will often have less chance of survival since there will be reproductive wastage where the ideal proportion of the sexes is not equality.

652. KAUL, K. N.,
MUKERJI, B. and
CHOPRA, R. N. 578.6
An indigenous mounting medium for microscopic work.
Curr. Sci. 1941 : **10** : 486–88.

A number of Indian grown substitutes for Canada balsam have been tested. A mixture of rosin and Dammar resin in xylol or benzol was found to be satisfactory. Turpentine was not a satisfactory solvent for Dammar resin or rosin.

653. SAHNI, B. 578.6
Permanent labels for microscope slides.
Curr. Sci. 1941 : **10** : 485–86.

In tropical countries paper labels on microscopic slides are liable to be impermanent owing to several causes. Two alternative methods of labelling are described—the use of a thin paint of cellulose solution and grinding with abrasive powder one end of the slide.

PLANT DISEASES AND PESTS 632

654. KUMAR, L. S. S. and
ABRAHAM, A. 632.5:576.312.35
Cytological studies in Indian parasitic plants. I. The cytology of *Striga*.
Proc. Indian Acad. Sci. 1941 : **14** : Sect. B : 509–16.

The species studied are *S. densiflora*, *S. euphrasioides*, *S. lutea* and *S. orobanchoides*. The somatic chromosome numbers determined from metaphase plates of ovary cells in each species are $n = 20$ and $2n = 40$.

The significance of secondary association and the probable basic number of chromosomes in the Scrophulariaceae has been discussed by Raghavan and Srinivasan in Cytologia (1940, Vol. XI, 37–54). In the present work the most frequent type of secondary association found in a random selection of 30 metaphase plates in *S. densiflora* is in 8 groups. This, together with certain other observations, has led the authors to conclude the 8 is the basic chromosome number in *Striga*.

655. CHAKRABARTI, S. 632.951.1:575(54.1)
What's doing in All-India—Assam.
Indian Fmg 1942 : **3** : 97–98.

The progress of pyrethrum selection and cultivation is recorded.

WHEAT 633.11

656. SANSOM, T. K. 633.11(68.9)
Wheat. Brief characteristics of varieties tested at the Plant Breeding Station, Salisbury, and available for distribution.
Rhod. Agric. J. 1942 : **39** : 11–14.

Very brief notes are given on 15 pure lines of wheat, small quantities of which are available for distribution to growers.

657. LOVE, R. M. 633.11:575.127.2:576.354.4:581.162.5
Chromosome behaviour in F_1 wheat hybrids. I. Pentaploids.
Canad. J. Res. 1941 : **19** : 351–69.

Meiosis was studied in pollen mother cells of two varieties of *Triticum dicoccum* (Vernal and Khapli), of two varieties of *T. durum* (Iumillo and Pentad), of four varieties of *T. vulgare* (Marquis—representing varieties which had not been derived from crosses with the 28-chromosome wheats; Hope—derived from the cross *T. vulgare* x *T. dicoccum*; R.L. 1544—derived from the cross *T. vulgare* x *T. durum*; and McMurachy's selection—a variety which was found in a field of Garnet and which is virtually immune to stem rust) and of 15 pentaploid hybrids derived from the above parents and the following additional varieties of *T. vulgare*—Marquillo (from the cross Marquis x Iumillo) and R.L.729 (from the cross Marquis x Pentad). One hybrid of *T. vulgare* x *T. Timopheevi* was also examined—not a single nucleus with 14 bivalents and 7 univalents was observed in 86 pollen mother cells of this hybrid. The investigation was part of an attempt to establish criteria indicating relationships between 42- and 28-chromosome wheats, with particular reference to McMurachy's selection.

One plant of Hope and one of Marquillo has only 41 chromosomes. The parent varieties showed occasional univalents but no multivalents.

In all the pentaploid hybrids (except that involving *T. Timopheevi*) the commonest type of cell was either that showing 14 bivalents + 7 univalents or 1 quadrivalent + 12 bivalents and 7 univalents. Cells containing 1 quadrivalent were common in the crosses Marquis x Pentad, McMurachy x Pentad and R.L. 1544 x Pentad. Although the above two types of cells were the most frequent, many other types were observed—e.g. cells with 15 bivalents and 5 univalents; with 1 trivalent, 13 bivalents and 6 univalents; with 2 quadrivalents, 10 bivalents and 7 univalents; with 1 quadrivalent, 3 trivalents, 9 bivalents and 4 univalents; and cells containing hexavalents and pentavalents. Crosses involving Pentad had 75 to 92% of cells with one or more multiple associations. Inversion bridges and other irregularities were also observed. The percentages of micronuclei per tetrad were also investigated. The fertilities of the hybrids were determined—the percentage of fertile florets was as high as 74% in the cross Marquis x Iumillo and as low as 0% in the cross McMurachy x Khapli.

Attempts were made to establish relationships between the 42- and the 28-chromosome wheats using the crosses R.L. 1544 x Iumillo and Hope x Vernal as standards for comparison. The following criteria were used—the percentage of pollen mother cells with 14 bivalents and 7 univalents (greatest in the hybrids between related varieties); the average number of chromosomes involved in multiple associations (lowest in hybrids between related varieties); and fertility (greatest in hybrids between related varieties). On the first two criteria Marquis appears to be more closely related to *T. dicoccum* var. Vernal than to *T. durum* var. Iumillo but the fertility criterion suggested the opposite result. McMurachy's selection appeared to be most closely related to *T. durum* var. Iumillo.

658. PETO, F. H. and 633.11:575.129:633.289
YOUNG, G. A. 633.11:575.127.5:576.356:581.04
Hybridization of *Triticum* and *Agropyron*. VII. New fertile amphidiploids.
Canad. J. Res. 1942 : **20** : Sect. C : 123–29.

Fertility was induced in the following sterile intergeneric hybrids by means of colchicine treatment: *Agropyron glaucum* crossed with *T. vulgare* var. Mosaida, Ruby, Milturum, and Kharkov, *T. durum* var. Mindum and Black Persian, *T. turgidum*, *T. dicoccum* var. Vernal, *T. pyramidale*.

The capsule method of treatment, used only on plants in which neither the seed treatment nor the immersion method was effective, was applied to seedlings just prior to tillering. Gelatine capsules, commonly used for pharmaceutical preparations, were coated with collodion to prevent dissolution. These were filled with an agar gel solution containing 0·1 or 0·4% of colchicine. The stems of the seedlings were cut off about 2 cm. above the ground level and the capsules were slipped over this short stem.

Tabulations are given of the percentage fertility of amphidiploids produced in the greenhouse and in the field, and treated by the following methods, Myers ("Plant Breeding Abstracts", Vol. X, Abst. 464), Myers and immersion, immersion and capsule, and of percentage relative effectiveness of treatments applied by different methods.

Work is in progress on the agronomic possibilities of the new amphidiploids.

659. CHRISTIAN, C. S. and
GRAY, S. G. 633.11:575.42:578.08
Interplant competition in mixed wheat populations and its relation to single plant selection.
J. Coun. Sci. Industr. Res. Aust. 1941 : **14** : 59–68.

Small and large seeds of an early and a late maturing variety were used in these experiments. Plots were sown in a complex experiment so as to give information on the competitive effects of these differences, taken singly and together, on single plants. The characters considered were early and final tiller number, number of ears, number of grains per ear, weight per grain and total yield of grain.

The characters most affected were final tiller number, ear number and yield of grain. The competitive effects on yield were in favour of large seed and the late variety and it appears that seed size produces its effect during tillering while the difference in earliness operates later and affects tiller survival, i.e. ear number. The two effects operate cumulatively.

It is suggested that the value of single plant selections from heterogeneous (e.g. F_2) populations could be improved by using more uniform seed; it might also be improved by a wider spacing than is now commonly used for wheat, so as to reduce competition. Statistical corrections might also be used to allow for the effects of competition. These methods are being studied in further experiments.

660. T . . ., M. J. 633.11–2.451–1.521.6(54)
Smut diseases of wheat.
Curr. Sci. 1942 : **11** : p. 78.

A note on the work of Mundkur and Pal (see Abst. 661).

661. MUNDKUR, B. B. and
PAL, B. P. 633.11–2.451.2–1.521.6(54)
Studies in Indian cereal smuts. II. Varietal resistance of Indian and other wheats to loose smut.
Indian J. Agric. Sci. 1941 : **11** : 675–86.

Nearly 100 varieties of wheat were tested under conditions of severe artificial infection for resistance to loose smut (*Ustilago Tritici* Pers.). A few varieties, including Imperial Pusa 114 and the Australian variety Federation, proved to be immune while some others including Imperial Pusa 120 and 165 were resistant; the majority however were susceptible. Attempts to select highly resistant or immune segregates in several partially susceptible varieties proved successful. B. P. P.

662. PAL, B. P. and
MUNDKUR, B. B. 633.11–2.451.3–1.521.6(54)
Studies in Indian cereal smuts. III. Varietal resistance of Indian and other wheats to flag smut.
Indian J. Agric. Sci. 1941 : **11** : 687–94.

Ninety-seven wheat varieties were tested for resistance to flag smut (*Urocystis Tritici*). The varieties 111–2–6, 111–2–8, 111–2–9, Geerlying, German and Hornblende proved to be immune while several others including Imperial Pusa 4 and 111, Dundee and Florence showed very high resistance. The remaining varieties showed varying degrees of susceptibility.

There are indications that the Indian strain of flag smut is physiologically different from that occurring in Australia. B. P. P.

663. WANG, Y.-C. 633.11–2.452:576.16:631.521.6:575(51)
Rust reactions of Chinese wheat varieties and certain Canadian hybrid strains.
Canad. J. Res. 1942 : **20** : Sect. C : 108–15.

The species of rust parasitizing *Triticum* in China are *Puccinia graminis Tritici*, *P. triticina* and *P. glumarum*. The experiments recorded show that Chinese wheats are susceptible to the physiological races of stem rust prevalent in North America.

Seventy-five lines of Canadian spring wheat derived from a cross between Renown Selection and Garnet have been tested and several are considered valuable breeding material if breeding methods are to be used in developing Chinese varieties resistant to the rusts.

664. 633.11–2.452–1.521.6:575(94)

New rust-resistant wheat.

Pastoral Rev. 1942 : **52** : p. 45.

A new variety of *Triticum* resistant to fungal attack has been developed at the Waite Agricultural Research Institute, S. Australia and named Warigo. It is the result of a cross between Nabawa and Hope.

OATS 633.13

665. HARRINGTON, J. B. 633.13:575(71.24)

Oat varieties and their production.

Bull. Saskatch. Agric. Ext. Dep. 1942 : No. 104: Pp. 8.

Promising new varieties of *Avena* species recorded include Valor (Sask. 1940), characterized by high yields, extreme earliness and smut resistance; Ajax (R.L. 1114), a high yielding, early maturing variety with good length and strength of straw and rather small white kernels; and Exeter (R.L. 53), which is resistant to stem rust, gives high yields and is expected to replace Victory and Vanguard in Manitoba and parts of Eastern Saskatchewan.

666. BOSE, R. D. and
MUNDKUR, B. B. 633.13–2.451.2–1.521.6(54)

Studies in Indian cereal smuts. IV. Varietal resistance of Indian and other oats to smuts.

Indian J. Agric. Sci. 1941 : **11** : 695–702.

Sixty Indian and foreign varieties of oats were tested for resistance to covered smut (*Ustilago Kolleri*) and many of the foreign varieties proved to be immune or highly resistant. None of the Indian varieties was resistant but one of several hybrids between Indian and exotic varieties was immune and another highly resistant. B. P. P.

MAIZE 633.15

667. MCROSTIE, G. P. and
MACLACHLAN, J. D. 633.15:575.125:631.557:581.44

Hybrid corn studies I.

Sci. Agric. 1942 : **22** : 307–13.

Seven maize hybrids were compared with three standard varieties in yield of fodder and grain, root development, strength of stalk, resistance of certain internodes to breaking, crushing and penetration, stalk structure and tolerance to corn borer. The hybrids were superior to the varieties in yield, resistance to lodging and in root development. The hybrids also had stronger internodes, a greater depth of lignified tissue and a larger number of vascular bundles.

MILLETS AND SORGHUM 633.17

668. RAMASWAMI, S.,
SARMA, P. S. and
SREENIVASAYA, M. 633.17:581.6:632.7

Studies in insect nutrition—assay of "quality" in crops.

Curr. Sci. 1942 : **11** : 53–54.

The rice moth (*Corcyra cephalonica*) has been used as a test animal for determination of quality in crops. Varieties of *Sorghum vulgare* and *Eleusine coracana* have been analysed by this "insect method" which has the advantage that only about 20 grm. of the material are required for the experiment.

Data indicate that two varieties of *S. vulgare*, namely, A.S. 29 and A.S. 1093, have the same percentage of total N, but fat content is higher in A.S. 1093. A comparison of A.S. 29 and the jowar variety T_1 shows that percentage of ether extract is the same in both, but T_1 has a lower N content and this is reflected in insect growth. Varieties of ragi are comparatively poor in fat content.

669. PATEL, Z. H. 633.171:581.192:575.242

A sugary mutant in pearl millet (*Pennisetum typhoideum*).

Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric. : abst. 40 : p. 258.

825 sugary grains as against 1,742 starchy grains were found in one head; the former bred true to the character. The mutation has been designated by the symbol *su* and behaves like the similar mutation in maize. B. P. P.

670. RANGASWAMI AYYANGAR, G. N. and
KUNHI KORAN NAMBIAR, A. 633.174:575.061.6
The inheritance of depth of green colour in the leaves of sorghum.
Curr. Sci. 1941 : **10** : 492–93.

Three types of green colouring of the leaves are found in sorghums—dark green, green and light green. All wild sorghums (except the Para sorghums) and most of the African varieties are dark green; the Para sorghums and the Indian varieties are green; and the Chinese varieties are light green. F_2 and F_3 segregations in crosses involving all three types show there are two factors for chlorophyll colour—C_1 and C_2. The bottom recessive, $c_1c_1c_2c_2$, is light green and either C_1 and C_2 converts light green into green. The presence of both C_1 and C_2 produces dark green.

671. RANGASWAMI AYYANGAR, G. N.,
SANKARA AYYAR, M. A. and
KUNHI KORAN NAMBIAR, A. 633.174:575.061.6:581.46
The inheritance of purple pigment at the base of anthers in sorghum.
Curr. Sci. 1941 : **10** : 491–92.

A heterozygous mutant with brown grains and the base of the anthers coloured purple was found in a South Indian variety of *Sorghum Dochna*. Purple anther colour and brown grains behaved as simple dominants to non-purple anthers and white grains. Every plant with the base of the anther purple had brown grains and no white grain occurred in plants with purple-based anthers. The gene for purple at the base of the anther is designated A_b and is very closely associated with one of the two *B* factors for brown colour of pericarp.

672. RANGASWAMI AYYANGAR, G. N. and
PONNAIYA, B. W. X. 633.174:581.46:575.11
Sorghums with felty glumes.
Curr. Sci. 1941 : **10** : 533–34.

The occurrence of felty, hairy and "glabrous" glumes in sorghum is discussed. A cross between felty and hairy glumed varieties of *S. Dochna* produced a felty F_1 and gave an F_2 segregation of 3 felty : 1 hairy. A second cross between the felty glume and another *S. dochna* which had glabrous glumes (short hairs at the fringe) produced a felty F_1 and gave an F_2 segregation of 9 felty : 3 hairy : 3 glabrous with long hair at fringes : 1 glabrous with short hair at fringes. The segregations in 16 F_3 families from this second cross confirmed the F_2 segregation. The following genes are suggested—*Gh* v. *gh* for hairy v. glabrous and *Gf* v. *gf*, the gene *Gf* converting hairy into felted.

673. RANGASWAMI AYYANGAR, G. N. and
PONNAIYA, B. W. X. 633.174:581.46:575.11
Wavy peduncle—the basic cause of goose-necking in sorghum.
Curr. Sci. 1941 : **10** : 528–30.

The distribution and the cause of wavy peduncles is discussed. Two crosses between wavy and straight peduncle varieties, one in the cultivated sorghums and the other in *S. sudanense*, both had F_1's with straight peduncles and both showed F_2 segregations of 3 straight : 1 wavy. The gene pair for straight v. wavy panicles is styled *Wy wy*.

RICE 633.18

674. GANGULI, P. M. and
SEN, J. L. 633.18:575
Variability in *Boro* paddy.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 35 : p. 256.

The paper discusses the variability in respect of length and breadth of paddy and rice, 1,000 grain weight, height, number of tillers, etc., in *boro* or spring rice. Details are not given in the abstract. B. P. P.

675. KADAM, B. S. 633.18:575.061.634
Genic analysis of rice. II. Chlorophyll deficiencies.
Indian J. Genet. Pl. Breed. 1941 : 1 : 13–27.

The inheritance of five types of lethal chlorophyll deficiency and of six virescent types was studied. Lethal albino and lethal yellow seedlings were due to either single or duplicate genes, but some lines had an irregular behaviour for the inheritance of albinos. The other three deficient types were pale-yellow stunted (caused by the gene *st*), pale-yellow twisted (due to a single gene) and pale-yellow with withering of tips of leaves (due to two complementary genes, tp_a and tp_b). Intercrosses of six virescent types showed the presence of six genes. Five of these are non-allelomorphic and are designated v_1 to v_5. The sixth is an allele of v_1 and is designated v_1^J (it is higher in the series than v_1).

676. DIXIT, P. D. 633.18:575.11.061.6
Some interesting features in a cross between a purple and a green coloured variety of paddy.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 39 : p. 257.

In a cross between a purple paddy with red rice and a green paddy with white rice, the F_1 was purple as expected but the rice colour was white instead of red. In the F_2 also no plant with red rice colour appeared. B. P. P.

677. PAL, B. P. and
RAMANUJAM, S. 633.18:575.11.061.633
A new type of variegation in rice.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 38 : p. 257.

A fuller account of this work has already appeared (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 23). B. P. P.

678. NANDI, H. K. and
GANGULI, P. M. 633.18:575.11–181.13
Inheritance of height of plants in *Sail* paddy.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 34 : p. 256.

Tallness is dominant to "dwarfishness" except in one case where a dwarf type proved to be dominant, showing monogenic segregation in F_2. B. P. P.

679. RAMIAH, K. and
RAMASAMY, K. 633.18:575.125:581.144:581.48
Hybrid vigour in rice (*Oryza sativa* L.).
Indian J. Genet. Pl. Breed. 1941 : 1 : 4–12.

A high correlation between grain weight and embryo weight (correlation coefficient being +0·9) was found in pure lines of rice. An increase in grain weight of seeds from crosses only occurred when the female parent was a small grained type and the male a large grained. In one set of crosses involving the largest difference in grain size between the parents, the size of embryo in the seed from the cross large grain female x small grain was the same as that from large grain selfed but it was smaller than the large grain selfed in the reciprocal cross small grain female x large grain. Nevertheless both F_1's showed marked hybrid vigour and it is therefore suggested that neither the embryo nor endosperm size can account for the manifestation of hybrid vigour. Four crosses in all were examined. In three of them hybrid vigour was shown by increased tiller production and increased yield. In the fourth there was no increased tiller production but there was an increase in yield due probably to a better combination of ear number and ear length than in either of the parents. The relative growth rates of the F_1's and the parents were found to be nearly equal though the initial differences between the F_1 and the parents tended either to increase or decrease at the later stages of development.

680. Ayyangar, C. R. S., Parthasarathy, N. and Ramaswami, K. 633.18:575.127.2
Inter-specific hybridization in Oryza.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 37 : p. 257.
The brief abstract states that the full paper deals with the success obtained in the evolution of economic strains from the cross *O. sativa* x *O. longistaminata*, and the building up of the tri-specific hybrid, *O. sativa* ($n = 12$) x *O. officinalis* ($n = 12$) x *O. Eichingheri* ($n = 24$). B. P. P.

ROOTS AND TUBERS 633.4

681. Mohammad, A. and Sikka, S. M. 633.42:575.127.2:576.354.4 633.853.49:575.127.2:576.354.4
Cytological investigations in *raya* (*Brassica juncea* Coss), *toria* (*Brassica napus* L. *var. dichotoma*, Prain) and F_1 hybrid between them.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 43 : p. 259.
The *raya* parent has $2n = 36$ chromosomes and the *toria* parent $2n = 20$ chromosomes. The F_1 hybrid has $2n = 28$ chromosomes, conjugating into 10_{II} and 8_I according to the *Drosera* scheme. Evidence is adduced to show that the 10 bivalents in the hybrids are formed allo-syndetically. B. P. P.

682. 633.42:581.162.52:576.356.5
Howard, H. W. 635.15:581.162.52:576.356.5
Self-incompatibility in polyploid forms of *Brassica* and *Raphanus*.
Nature, Lond. 1942 : **149** : p. 302.
Autotetraploid branches of *Brassica Rapa, B. campestris* and *R. sativus* produced by colchicine treatment were found to be self-incompatible like the corresponding diploid branches. In *B. chinensis* and *B. oleracea* self-incompatible autotetraploids were also observed. The allotetraploid species *B. carinata, juncea* and *Napus* are self-compatible and so were experimentally produced *Raphanobrassica* amphidiploids. H. W. H.

683. 633.491:581.143.26.04
Two potato crops in one year.
Mon. Sci. News 1942 : No. 8 : p. 3.
The use of ethylene chlorhydrin for breaking the dormancy of potato tubers and so producing two crops a year is recommended for breeding work.

684. Pal, B. P. and Puskar Nath. 633.491:581.162.52:575.11
Genetic nature of self- and cross-incompatibility in potatoes.
Nature, Lond. 1942 : **149** : 246–47.
The diploid ($2n = 24$) species, *Solanum aracc-papa, S. Caldasii, S. chacoense, S. Jamesii* and *S. subtilius*, are characterized by a high degree of physiological self-incompatibility while several tetraploid ($2n = 48$) species and the hexaploid ($2n = 72$) species *S. demissum* are self-compatible. The genetics of self-incompatibility was studied in sixteen varieties of *S. Caldasii* and one variety of *S. subtilius* and in four families derived from crosses involving these varieties. At least five sterility factors, S^1 to S^5, were found and they behaved as oppositional factors. Other results suggest that *S. chacoense* possesses a fertility factor, *F*, in addition to the *S* factors. It is also suggested that there appear to be no good reasons for regarding *S. Caldasii* and *S. subtilius* as separate species.

685. 633.491–1.524
Where did the potato come from ?
Mon. Sci. News 1942 : No. 7 : 2–3.
An account of the collecting expedition to Central and South America in 1938–9 as a result of which the Empire Potato Collection of the Imperial Agricultural Bureaux has been established. (See also "Plant Breeding Abstracts", Vol. XI, p. 244.)

686. Silow, R. A. and
Yu, C. P. 633.51:575.061.6:575.113.3
Anthocyanin pattern in Asiatic cottons.
J. Genet. 1942 : **43** : 249–84.

Seven new allelomorphs affecting anthocyanin pigmentation—red margin/spotted, red margin/spotless, red vein/spotted, sun-red/spotless, thumbnail-red-spotted, green stem/spotless and green stem/tinged ghost—in the cultivated Asiatic cottons *Gossypium arboreum* L. and *G. herbaceum* L. are described. All seven types were recognized in Chinese material and all seven are shown to belong to the same allelomorphic series at the locus R_2—previous work has shown that seven other allelomorphs also occur at this locus (see "Plant Breeding Abstracts", Vol. III, Abst. 310 and Vol. VIII, Abst. 1049). The manifold expressions of the fourteen alleles are considered with special reference to their interpretation as either close linkage or as multiple allelomorphism with pleiotropy. The occurrence of occasional types different from their presumed parents, which would not be expected on the basis of simple allelomorphism and the geographical distribution of the alleles, is also discussed. H. W. H.

687. Ramiah, K. and
Nath, B. 633.51:575–181.12:581.45
Note on a new gene affecting leaf shape in Asiatic cottons.
Curr. Sci. 1941 : **10** : 490–91.

In the South Indian cotton variety C_7 (a form of *G. arboreum* var. *neglectum* f. *indica*) which has lobed broad leaves, there has been isolated a mutant, the first one or two leaves of which are nearly normal but the later leaves of which show a progressive reduction of the two lateral lobes resulting in tadpole-shaped leaves and finally in leaves consisting of only the single middle lobe. In crosses the mutant type behaved as a simple recessive to the normal lobed type and it was also shown that the new gene pair (*S–s*) is not a member of the *L* series of allelomorphs.

688. Ramiah, K. and
Nath, B. 633.51:575.113.3.061.6
A new gene affecting anthocyanin pigmentation in Asiatic cottons.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 41 : p. 258.

A new member of the R_2 series of alleles controlling anthocyanin pigmentation in Asiatic cottons is reported. B. P. P.

689. Panse, V. G. and
Ramiah, K. 633.51:575.4(54)
Competition in mixed cotton crops.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric. : abst. 19 : p. 251.

The local cotton in Central India is a mixture of Upland (*G. hirsutum*) and desi (*G. arboreum* var. *neglectum*) types which are in stable equilibrium, the proportion of the components, however, varying characteristically in the several tracts. The interesting observation is made that when upland cotton is grown in mixture with the desi cotton, it suffers significantly less from diseases and gives a higher yield than when grown by itself. B. P. P.

690. Ramiah, K. and
Gadkari, P. D. 633.51:581.49:575.11
Further studies on the Punjab hairy lintless gene in cotton.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 42 : p. 258.

The gene has been found to affect differentially the viability of the type under different environmental conditions, to disturb segregation for leaf shape, and to affect the growth of the plant according as it is present in heterozygous or homozygous condition. B. P. P.

691. 633.523:582
Difference between *Capsularis* and *Olitorius*.
Bull. Indian Cent. Jute Cttee 1941 : **4** : 368–69. (From Jute Absts 1942 : **6** : 18–19, Abst. 83).

Species differences are enumerated from the standpoint of nomenclature, fibre colour, fineness, strength, "taper", bark and chemical composition and reaction.

692. 633.526.23:575.127.2
Quarterly notes of the Sisal Experimental Station, Mlingano, Tanga.
Dep. Agric. Sisal Board, Tanganyika 1941 : Nos 21–22 : Pp. 28.
The notes include records of breeding work with *Agave*. Flowers of *A. angustifolia* x *A. amaniensis* hybrids were pollinated either with their own pollen, or that from *A. amaniensis*, and the seeds were prepared for planting. Among first generation hybrid seedlings raised at Amani were several new interspecific hybrids and some crosses between plants of a first generation of *A. angustifolia* (raised from seed) that gave exceptionally high total leaf counts. Two plants of the *A. angustifolia* x *A. amaniensis* hybrids have been selected for further tests by vegetative propagation as well as by propagation from seed.

SUGAR PLANTS 633.6

693. Paul, L. B. 633.61:575(54.8)
Studies on the performance of some Coimbatore canes regarding maturing-period, yield, habit, etc., under the improved methods of cultivation.
Proc. 9th Annu. Convent. Sugar. Technol. Ass. India 1940 : Part I : 41–49.
A tabulation is supplied of various Coimbatore canes and includes information on origins and characteristics, analyses of juice and cane, and yields.

694. Dodds, H. H. 633.61:575(68)
Notes on the present sugarcane variety position in South Africa, 1941.
Proc. 15th Annu. Congr. S. Afr. Sug. Tech. Ass. 1941 : 78–94.
After a discussion of the varietal position (with special reference to P.O.J. 2725 and Co.'s 281, 290 and 301) and some notes on recent introductions (especially Co.331), a short account is given of seedlings raised in South Africa from seed obtained from Coimbatore, Mauritius and Honolulu. In an appendix a list is given of sugar canes in the collection at the experiment station.

695. D . . . ., H. H. 633.61:575(69.82)
Sugarcane varieties in Mauritius. A commentary.
S. Afr. Sug. J. 1941 : **25** : p. 541.
When establishing sugar cane in any new area, the need for raising seedlings in bulk from promising parents and the selection of individuals specially adapted to local conditions is stressed.

696. McIntosh, A. E. S. 633.61:575(72.98)
Recent developments in sugar-cane breeding in Barbados.
Emp. J. Exp. Agric. 1942 : **10** : 31–42.
An account is given of the recent work of the British West Indies Central Sugar-Cane Breeding Station. The paper is divided into 7 parts—introduction; the breeding problems; the breeding policy; the breeding work; testing, selection, and dispatch of seedlings; a brief review of the results; and future policy. The section on the breeding work considers selection of parent material, breeding technique and selection of crosses to be made. In discussing the results of the breeding work it is stated that, as the nobilization work has produced within a few years several outstanding varieties (such as B. 34104, 35187, 35245, 37161 and 37193), purely noble-cane breeding will not be continued.

697. Bell, A. F. 633.61:575(94.3)
Report of the committee on seedling propagation.
41st Rep. Bur. Sug. Exp. Stas Brisbane 1941 : 16–18.
Details are given of the crosses made in the 1941 cross-pollination season and of selected seedlings. Fuzz has been satisfactorily stored in sealed moisture-free containers at temperatures ranging around 40° F. for a year. Arrowing was usefully retarded in several varieties by defoliation.

698. McMartin, A. 633.61:575.247
Bud sports of sugarcane in Natal.
Proc. 15th Annu. Congr. S. Afr. Sug. Tech. Ass. 1941 : 95–99.
An account is given of vegetative mutations observed in sugar cane varieties. The mutations involve changes in the colour of the stem, habit of the leaf and other organs, and in vigour.

699. 633.61:581.9
BADAMI, V. K. 633.61:575(54.1)
New sugarcane seedlings for Orissa.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 27 : p. 253.

Mention is made of the discovery of a trailing form of *S. spontaneum* with sweet stems and a gigantic form of *S. arundinaceum*. Conditions in Orissa are stated to be very suitable for raising sugar-cane seedlings; some seedlings are said to be full of promise. B. P. P.

700. 633.61–2–1.521.6(94)
Bureau of Sugar Experiment Stations. Annual Report.
Aust. Sug. J. 1942 : **33** : 376–81.

Trials are reported of cane varieties tested in regard to resistance to gumming disease (*Bacterium vasculorum*), downy mildew (*Sclerospora sacchari*), leaf scald (*Bacterium albilineans*), Fiji disease and others.

701. CHONA, B. L. and
PADWICK, G. W. 633.61–2.483–1.521.6(54)
More light on the red-rot epidemic.
Indian Fmg 1942 : **3** : 70–73.

Data on basal and nodal infections by *Colletotrichum* sp. of many Co cane varieties in the United Provinces and Bihar are tabulated.
It is concluded that a new strain of *C. falcatum* with abundant sporulation is responsible for failure of Co 213 in an area where it had flourished for more than 10 years.

STIMULANTS 633.7

702. GREENLEAF, W. H. 633.71:575.127.2:576.356.5:581.162.5
Genic sterility in *Tabacum*-like amphidiploids of *Nicotiana*.
J. Genet. 1942 : **43** : 69–96.

A further paper on the male-fertile but female-sterile experimentally produced amphidiploids *Nicotiana silvestris-tomentosa*, *N. silvestris-tomentosiformis* and *N. silvestris-Setchellii* (for previous papers see "Plant Breeding Abstracts", Vol. XI, Abst. 1053). Studies of microsporogenesis showed that most cells of the amphidiploids formed either 24 bivalents or 23 bivalents plus 2 univalents. The F_1 from the cross *N. Tabacum* x 4*x N. silvestris-tomentosa* also formed either 24 bivalents or 23 bivalents plus 2 univalents. Pollen size measurements and pollen fertility counts were made. The percentage of good seeds was found to be 90% in *N. Tabacum*, 65% in the *N. silvestris-tomentosiformis* amphidiploid of Kostoff but only 17% in the F_1 hybrid from *N. Tabacum* x Greenleaf's *N. silvestris-tomentosa* amphidiploid. The percentage of good seeds is also given for other amphidiploids and their hybrids. The effect of crossing-over before restitution nucleus formation is shown and it is suggested that the fertility of Kostoff's amphidiploid may be due to such crossing-over for complementary sterility genes, the abortion of embryo sacs in Greenleaf's female-sterile amphidiploids being due to the action of such complementary genes. It is also pointed out that, while autotetraploid *N. Tabacum* ($2n = 96$) is a normal plant, the allo-octaploid *N. silvestris tomentosa* ($2n = 96$) is a monstrosity—this is explained by suggesting that *N. Tabacum* has undergone physico-chemical changes since its origin.

703. WARD, G. M. 633.71:581.6
Nicotine—a product of tobacco.
Tech. Bull. Dep. Agric. Canada 1941 : No. 38 : Pp. 21.

The work contains a tabulation showing the nicotine content of tobacco as influenced by varietal characteristics. The genetical constitution of any variety controls the nicotine content, which varies in different parts of the plant.

704. PERERA, P. R. 633.72:581.6:575
A non-fermenting type of the tea plant, *Camellia Thea*, Link.
Curr. Sci. 1941 : **10** : p. 485.

Unfermented tannin was found in the infusions from fired tea from each of two bushes which had originated from the same split seedling. The leaves of three other pairs of bushes from

split seedlings fermented normally. There thus appears to be a genetical factor for fermentation. Further investigations have shown that there are many types of tea ranging from non-fermenting types through poor and medium types to types which ferment rapidly. The fermenting factor is connected with the presence or absence of an oxidising enzyme system.

705. Posnette, A. F. 633.74:581.162.3
Natural pollination of cocoa, *Theobroma leiocarpa*, on the Gold Coast.
Trop. Agriculture, Trin. 1942 : **19** : 12–16.

The results of a three-year investigation showed that insects are the pollinating agents of cocoa on the Gold Coast. During profuse flowering about 10% of the flowers are pollinated and in low flowering periods about 80%. Only one species of ant (out of five tried) caused pollination and there is considerable evidence that non-nocturnal flying insects bring about a large proportion of natural pollinations.

CONDIMENTS 633.84

706. Pal, B. P.,
Ramanujam, S. and
Joshi, A. B. 633.842:576.356.5:581.04
Colchicine-induced polyploidy in crop plants. II. Chilli (*Capsicum annuum* L.).
Indian J. Genet. Pl. Breed. 1941 : **1** : 28–40.

Tetraploid ($2n = 4x = 48$), periclinal tetraploid-diploid chimaeras, semi-sterile plants and one family containing a few tall mutant plants were obtained by soaking seeds of chilli (*Capsicum annuum*) in aqueous colchicine solutions. In the next generation some of the tetraploids gave only tetraploids while others produced tetraploids and diploids (the parent plants were therefore mixoploids). The semi-sterile plants produced equal numbers of normals and semi-steriles and cytological investigation showed that the semi-sterility was due to an interchange of segments of non-homologous chromosomes. The mutants bred true to type. Meiosis was studied in the tetraploids—they formed an average of 2·9 quadrivalents per nucleus with a maximum of 7 quadrivalents observed in 2 nuclei of 248 examined. About 63% of the second metaphase plates showed a segregation of 24 : 24 at first division. Short descriptions are also given of the tetraploids—the tetraploids had fewer but bigger seeds than the diploids.

OIL PLANTS 633.85*

707. Kumar, L. S. S. and
Abraham, A. 633.853.74:581.162.5:576.354.4:576.356
A cytological study of sterility in *Sesamum orientale* L.
Indian J. Genet. Pl. Breed. 1941 : **1** : 41–60.

Meiosis was studied in normal and sterile plants of the Bijapur White variety of *Sesamum orientale*. The chromosome number in both fertile and sterile plants was found to be $2n = 26$. A persistent "secondary nucleolus" was observed in mitosis and meiosis in both types of plants. It is suggested that the sterility is probably due to a recessive factor. Failure of gametophyte development is responsible for sterility on the female side. Pollen mother cells of the sterile forms show various abnormalities including the formation of an abnormal number of daughter cells per mother cell. This was usually due to abnormal spindle development.

708. Webster, C. C. 633.854.56:575.42(68.97)
Notes on the progress of tung experimental work. The selection and yield recording of promising trees.
Nyasald Agric. Quart. J. 1941 : **1** : No. 4 : 16–17.

Details are given of the selection and yield of promising trees of both *Aleurites Fordii* and *Aleurites montana*.

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* See also Abst. 681.

709. Smith-White, S. 633.854.56:581.162.3
Studies on the tung oil tree (*Aleurites Fordii* Hemel.)
J. Roy. Soc. N.S.W. 1940 : **74** : 42–73.

The origin of the tung trees now growing in Australia is discussed. Descriptions are also given of their yields and vegetative and flowering characters. The ordinary bee appears to be the commonest pollinator. Parthenocarpic fruit development did not occur.

RUBBER PLANTS 633.91

710. 633.912:575(91)
Abridged report on the work in 1940 of the Rubber Research Institute of Malaya, 1941 : Pp. 19.

Amongst other things, some account is given of the breeding and selection work. Family B.84 x G.1 now shows a yield of 13·5 lb. per tree at an average age of 8 years 2 months. Illegitimate seedling families from P.B.49 are outstanding in their yields.

711. Ford, C. E. 633.912.00.14(54.8)
The performance of imported clones in Ceylon—V.
Quart. Circ. Rubb. Res. Scheme (Ceylon) 1941 : **18** : 70–86.

Notes are given on the performance of the following clones, T.J. 1 and 16, B.D. 5 and 10, P.B. 25, 86 and 186, Glenshiel 1, Pil.B. 84, P.R. 107, WAR 4 and A.V.R.O.S. 255 and 352. Wagga 6278 is now approved for large scale use and P.B. 25 has been removed from the lists of varieties approved for planting.

FRUITS 634

712. Thomas, P. T. 634.13:576.356:581.331.2:576.356.5
A useful abnormality of the pollen in a pear.
Nature, Lond. 1942 : **149** : 168–69.

In the diploid pear variety Beurré Bedford ($2n = 34$), meiosis is normal but cell walls fail to develop between the four haploid nuclei in the pollen mother cells. Immediately before the first pollen grain mitosis these nuclei begin to fuse with one another and so there are formed 82% of grains with one tetraploid generative nucleus, 9% with one triploid and one haploid, 7% with two diploid, 2% with one diploid and two haploid, and less than 1% with four haploid nuclei. In the cross diploid female x B. Bedford male 7 diploid and 4 tetraploid seedlings were obtained and in the cross tetraploid female x B. Bedford 3 tetraploids and 2 pentaploids. Using B. Bedford as the female parent only diploids were obtained from crosses with diploids and only triploids from crosses with tetraploids. By using B. Bedford as a male parent it is thus possible to synthesize a wide range of new polyploid forms.

713. Lewis, D. and Modlibowska, I. 634.13:576.356.5:581.162.5
Genetical studies in pears. IV. Pollen-tube growth and incompatibility.
J. Genet. 1942 : **43** : 211–22.

Self-incompatibility in diploid pears was found to be due to arrested pollen-tube growth. In a cross between two diploid varieties (Early Market x 2*x* Fertility) both compatible and incompatible tubes were observed. The somatically doubled autotetraploid Fertility is self-fertile but both compatible and incompatible tubes were found in its styles after selfing. It is suggested that the compatible tubes have the constitution S_1S_2 and the incompatible ones either S_1S_1 or S_2S_2. It was also found that compatible tubes of the tetraploid grow faster than compatible tubes of diploids both in tetraploid and in diploid styles. The growth of pollen-tubes of the diploid variety Beurré Bedford was also investigated: this diploid variety produces pollen grains with haploid, diploid, triploid and tetraploid nuclei. Its pollen-tubes have a high rate of growth but they usually fail to fertilize the eggs. The result of this normal pollen-tube growth without fertilization is the formation of seedless fruits.

714. Crane, M. B. and Lewis, D. 634.13:581.162.5:576.356.5:581.163
Genetical studies in pears. III. Incompatibility and sterility.
J. Genet. 1942 : **43** : 31–43.

Tests of self-compatibility were made with 19 diploid, 8 triploid and 2 tetraploid varieties of

pears. With two exceptions (the diploid and tetraploid forms of Fertility), all the varieties were either self-incompatible or only self-compatible to a low degree. When selfed the diploid form of Fertility sets a full crop of seedless fruits and the tetraploid form a full crop of fruits which contain seeds. In 193 intervarietal cross-pollinations only 2 cases of complete cross-incompatibility were found—both these cases were of the type polyploid female x diploid male. Some varieties were found to be more fertile on the male than on the female side and others to be more fertile on the female side than on the male. Triploid varieties produced low proportions of good pollen and of good seeds. Beurré Bedford, a diploid variety, gave peculiar results in pollinations with other varieties—this variety has abnormal pollen development. Parthenocarpy was found to be frequent after self-pollination.

NUTS 634.5

715. MEHTA, T. R. 634.58:575(54)
Extension of United Provinces groundnut cultivation.
Indian Fmg 1942 : **3** : 85–86.

Work on improvement of *Arachis* sp. has resulted in the production of promising types for yield and oil content. T18, T23, T24, T25 and T29 are recommended for expansion in different parts of the United Provinces.
Problems involved in improvement work and a future programme of selection are outlined.

PALMACEOUS AND OTHER TREE FRUITS 634.6*

716. AGNEW, G. W. J. 634.651:575(94.3)
Notes on the papaw and its improvement in Queensland.
Qd Agric. J. 1941 : **56** : 358–73.

Notes are given on the flower and plant types, on pollination and fertilization and on the improvement of papaya (*Carica Papaya*) by selection. Controlled hand pollination and fruit and seed setting are also discussed. Finally grafting is considered.

717. KUMAR, L. S. S. and
ABRAHAM, A. 634.651:576.312.35
Chromosome number in *Carica*.
Curr. Sci. 1942 : **11** : p. 58.

An examination of the chromosomes of the strictly dioecious species of *Carica* has been made in connexion with an investigation into the cytology of the different sex types in *C. Papaya*. The root tips of *C. pubescens* show 18 chromosomes at metaphase, and the same number has been reported in all other species of *Carica* investigated.

OTHER FRUITS 634.77

718. CHEESMAN, E. E. and
DODDS, K. S. 634.771:581.162.5:576.356.5
Genetical and cytological studies of *Musa*. IV. Certain triploid clones.
J. Genet. 1942 : **43** : 337–57.

The results of pollinating 18 triploid banana varieties with 5 fertile diploid species and certain tetraploids obtained in earlier experiments are given and discussed. Five of the 18 triploid clones appear to be sterile, two have set seed occasionally but have given no viable plants, and the remaining eleven have given hybrid plants from one or more pollens used on them. The majority of vigorous progeny from triploid x diploid crosses are tetraploids and, in crosses of triploid x tetraploid, pentaploids are frequently produced. This suggests that the triploid female parent produces unreduced triploid eggs. In certain crosses, however, e.g. Red banana (triploid) female x diploid, no tetraploids have been obtained, the seedlings with the highest chromosome numbers being triploids. H. W. H.

719. 634.771–2.484–1.521.6:575.127.2(72.98)
Developing the disease-resistant banana.
Crown Colonist 1942 : **12** : p. 250.

A note on the substance of a paper given to the Royal Society of Arts by C. W. Wardlaw on the work done at the Imperial College of Tropical Agriculture, Trinidad, and elsewhere.

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* See also Abst. 724.

720. 634.835:575(54)

Grape cultivation in India.

Curr. Sci. 1942 : **11** : p. 78.

A report by the Agricultural Marketing Advisor in India giving the results of a survey on the marketing of grapes (*Vitis* sp.) stresses the need for increasing the area under this crop. There is need for a system of registration of approved nurseries, for classifying existing varieties and for evolving new varieties likely to be more profitable than those under cultivation.

721. Popenoe, W. 634.835:575:551.566.1

Grapes for tropical America.

Trop. Agriculture Trin. 1942 : **19** : 23–28.

The need of special grape varieties for humid tropical regions is stressed and reference is made to the work of Fennel in Florida (see "Plant Breeding Abstracts", Vol. XII, Abst. 252). The varieties grown at present are described—these include the Isabella grape.

FORESTRY 634.9

722. Johnson, L. P. V. 634.972.3:575.127.2:581.143.26:581.6

Studies on the relation of growth rate to wood quality in *Populus* hybrids.

Canad. J. Res. 1942 : **20** : Sect. C : 28–40.

The growth rate and wood quality of *Populus alba*, *P. grandidentata*, *P. tremuloides* and two F_1 hybrids, *P. alba* x *P. grandidentata* and *P. alba* x *P. tremuloides*, were investigated. Most of the hybrids grew considerably faster than their parents. There were no indications that rapid growth is seriously detrimental to wood quality.

VEGETABLES 635*

723. Howard, H. W. 635.34:576.356.5:575.127.2:581.162.5:581.48

The effect of polyploidy and hybridity on seed size in crosses between *Brassica chinensis*, *B. carinata*, amphidiploid *B. chinensis-carinata* and autotetraploid *B. chinensis*.

J. Genet. 1942 : **43** : 105–119.

Amphidiploid *B. chinensis-carinata* and autotetraploid *B. chinensis* plants were obtained by colchicine treatment. The amphidiploid ($2n = 54$) had a fairly regular meiosis and was fertile. A high set of good seeds per fruit was obtained in the following crosses:—diploid *chinensis* x *carinata*; *chinensis-carinata* amphidiploid x diploid *chinensis*, x tetraploid *chinensis* and x *carinata*; and tetraploid *chinensis* x *carinata* and x *chinensis-carinata* amphidiploid (the female parent of the crosses being given first). In the other crosses only partially developed ovules were produced. If the assumption is made that *B. carinata* ($2n = 34$) has a "diploid seed-producing physiology", these results suggest the following general principles—a high set of good seeds per fruit is obtained from crosses of the types diploid x diploid, tetraploid x tetraploid and tetraploid female x diploid but never from the cross diploid female x tetraploid. It was also found that good seeds from the crosses of the type tetraploid female x diploid were only about one-third the size of normal seeds from selfing diploids (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1345). "Hybridity" was also found to produce a reduction in seed size.

724. 635.64:575(94.3)

Kajewski, S. F. 634.65:575:575.127.2

Cross breeding experiments in the Bowen district.

Qd Agric. J. 1941 : **56** : 473–76.

Details are given of tomato and passion fruit breeding. The latter included the crossing of *Passiflora edulis* with *P. incarnata*.

725. Fernando, M. 635.654–2.7–1.521.6

The relative resistance of some cowpea varieties to *Agromyza phaseoli* Coq.

Trop. Agriculturist 1941 : **96** : 221–24.

The variety 18aa buff showed a higher resistance to bean fly (*Agromyza phaseoli* Coq.) and yielded more than the two varieties V4 and 6. Descriptions of the varieties are given.

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* See also Abst. 682.

726. THADANI, K. I. and 635.655:581.162.32
MIRCHANDANI, R. T. 635.655:581.46:575.11.061.6
Studies on soy bean in Sind.
Proc. 28th Indian Sci. Congr. Benares 1941 : Part III : Sect. Agric : abst. 20 : p. 251.

Inter alia it is mentioned that imported big-seeded varieties are more subject to cross-pollination than Indian ones, and that purple flower colour behaves as a simple dominant to white.
B. P. P.

727. TOIT, J. J. du 635.655–2.148–1.521.6:575(68)
The cultivation of soybeans.
Fmg S. Afr. 1942 : **17** : 9–16, 53.

The cultivation of *Glycine* has not been successful in South Africa because the seeds are shed as soon as the pods are ripe. The breeding of improved adapted varieties at the Potchefstroom College of Agriculture has solved this problem, however, and 3 varieties (yellow-seeded) are recommended, namely, strains No. 34.S.51, No. 34.S.395, and No. 34.S.256.

728. RAMANUJAM, S. and
JOSHI, A. B. 635.657:576.356.5:581.04
Colchicine-induced polyploidy in crop plants. I. Gram (*Cicer arietinum* L.).
Indian J. Agric. Sci. 1941 : **11** : 835–49.

The variety Imperial Pusa 25 was treated with colchicine; treatment of seeds with a 0·25% aqueous solution of colchicine for half an hour gave the best results. In the generation immediately following the treatments, the affected plants showed a mixture of $2n$ and $4n$ tissue; in the subsequent generation pure tetraploids were obtained. The latter possessed a larger number of leaves per plant, and bigger leaflets, flowers, pods and seeds, than the diploids. The pollen grains and the stomatal guard cells were also bigger in the tetraploids. The percentage of sterile pollen grains was much higher in the latter.
Chromosome numbers in the tetraploids and diploids were 32 and 16 respectively. The meiosis in the former was fairly regular but one tetraploid showed a chromatin bridge and a fragment in a few cells at anaphase I. The tetraploid plants gave rise to tetraploid progenies only.
B. P. P.

Part II. Foreign.

STATISTICS 519

729. BRANDT, A. E. 519.24

The relation between the design of an experiment and the analysis of variance.

J. Amer. Statist. Ass. 1941 : **36** : 283–92.

With the modern development of design of field experiments the analysis of variance has become of a more complex character. In such experiments a large number of treatments are tested simultaneously and the analysis of, say, yields from such experiments should produce estimates of yield increase for each of the treatments tested. These estimates of what are called "individual treatment effects" are the basic idea of the analysis of variance of modern designs as developed by Fisher and Yates (see e.g. "Plant Breeding Abstracts", Vol. VIII, p. 304). The author shows how the idea may be extended and produces a general scheme for the computation of all "effects" in a general analysis of variance. Although the method is cumbersome where large-scale experiments are to be analysed, it is instructive and self-checking. It should also be of interest to those concerned with mechanical methods of computing. H. O. H.

BREEDING 575

730. FRIMMEL, F. v. 575:007

Hofrat Prof. Dr. Dr. h.c. Erich v. Tschermak-Seysenegg zum 70. Geburtstag.

(To Professor Erich von Tschermak-Seysenegg on his 70th birthday).

Züchter 1941 : **13** : 217–19.

A brief outline is given of Professor Tschermak's contributions both to genetics and plant breeding.

731. MALANDIN, G. A. (Editor) 575:633(47)

(Symposium of research work of the Čeljabinsk Regional Agricultural Research Station).

Ogiz-Čeljabgiz, Čeljabinsk 1939 : **1** : Nos. 1 and 2 : Pp. 520.

The symposium contains the following article of interest to plant breeders:—

Priezžev, G. V. (*Brief summary of the work of the breeding and seed production sections for* 1938). (*pp.* 301–05).

In 1937 some 1,900 spring wheats were examined for suitability as initial breeding material; 1,200 of them were discarded and in 1938 only 500 were sown, and of these 196 were chosen for mass selection. Some of the best selections are promising, being free from rust attack and lodging, earlier than the standard and superior in yields and quality.

Work on intra-varietal crossing has been started.

732. 575:633(73)

Field seed developments. Bureau of Plant Industry reports on research work going on to improve varieties and create new ones.

Seed World 1942 : **51** : No. 4 : 8–9.

The plant breeding work to which reference is made includes production of lucerne resistant to bacterial wilt, of improved field and garden forms of soya bean and also forms free from shattering, and of improved forms of red clover and lespedeza.

733. HILL, A. F. 575:633:551.566.1

Recent investigations in tropical and subtropical agriculture.

Chronica Botanica 1941 : **6** : 441–43.

A summary is given of the Proceedings of the Eighth International Congress of Tropical and Subtropical Agriculture held at Tripoli in March, 1939. The papers include many of interest to plant breeders.

734. 575:633–1.521.5

Field plantings verify variety names. New York AES tests 968 stocks to check on performance as well as on varietal purity.

Seed World 1942 : **51** : No. 3 : 20–21.

A great many of the stocks of commercial farm crop seeds tested proved to be very mixed and gave rise to crops of inferior quality. Vegetable seed stocks on the other hand were excellent.

735. MENDEL, G. 575.1
Versuche über Pflanzen-Hybriden. **(Experiments on plant hybrids).**
Züchter 1941 : **13** : 221–68.

The original manuscript of Mendel's paper is here reproduced.

736. COOPER, D. C. and BRINK, R. A. 575.127.2:581.141
The endosperm as a barrier to interspecific hybridization in flowering plants.
Science 1942 : **95** : 75–76.

It is suggested that in addition to the trophic properties commonly attributed to it, the endosperm plays a basic rôle in the morphogenetic changes in the transformation of ovules into seeds, that the behaviour of the endosperm during early post-fertilization stages is significantly influenced by the genetic make-up of the tissue and that in seeds which fail, the collapse of such seeds follows changes in the maternal tissues which arise as a result of hypofunction of the endosperm (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 397 and 1054, and Vol. XII, Abst. 530).

737. TIMOFEEFF-RESSOVSKY, N. W. 575.24
Eine biophysikalische Analyse des Mutationsvorganges. **(A biophysical analysis of the mutation process).**
Nova Acta Leopoldina 1940 : N.F., **9** : 209–40.

The work offers a comprehensive description of our present knowledge on the process of mutation and on the nature of the gene itself, especially as reached by biophysical investigations. By the use of exact quantitative methods, one can obtain from the action of ionized rays on the mutation frequency of the gene (gene or point mutations) quite definite ideas on this process. These are summarised in the "Treffer" theory (Timoféeff, Zimmer and Delbruck). According to this, the primary event for the liberation of a gene mutation is a single ionization occurring in a definite space (Treffbereich). The mutation itself is a structural change of a single, well defined atomic combination (molecule, micelle or part of a micelle). From this assumption it follows that also the gene itself or its most important part, must represent a physico-chemical unit. Here there is an interesting and surprising connexion with virus research, the conception of the gene as a physico-chemical unit is strongly supported by the discovery that at least many virus species are chemically individual mono-molecular structures supplied with the possibility of reproducing convariants of themselves and eliciting specific physiological actions, characteristic also of genes. This latter indicates that the investigation of the mutation process and the structure of the gene, ranges to-day far beyond the bounds of true genetics and requires the co-operation of biophysics, biochemistry, virus and immunity research.

The present results are drawn almost entirely from the zoological side (from Drosophila) and this work is built up almost entirely from zoological literature. However, in spite of this it is welcome from the botanical side as an outstanding review of this important field of research.

R. M. I.

738. JONES, D. F. 575.25:575.247
Somatic segregation.
Bot. Rev. 1941 : **7** : 291–307.

The following are the section headings in this short but comprehensive review:—atypical fertilization, chromosome elimination, somatic mutation, deletion, paired changes, chromosome bridges and position effect. There are 161 references in the bibliography.

CYTOLOGY 576.3

739. BEATTY, A. V. 576.353
Mitotic periodicity in leaves.
Genetics 1942 : **27** : p. 131. (Abst.).

A rhythmic cycle of mitotic activity was found in the leaves of 20 species—there are two periods of maximum activity (at about three in the morning and afternoon) and two of minimum activity (at about seven in the morning and five in the afternoon).

740. WADA, B. 576.356.5:581.04
Lebensbeobachtungen über die Einwirkung des Colchicins auf die Mitose, insbesondere über die Frage der Spindelfigur. (**Observations in *vivo* on the effect of colchicine on mitosis, in particular the question of the spindle figure**).
Cytologia 1940 : **11** : 93–116.

Observations were made on the effect of colchicine on the living cell in the process of division, using staminal hair cells of *Tradescantia* and it was possible to follow not only the morphology of the changes but also the changes in the colloidal condition. In contrast to other chemical agents which induce polyploidy, colchicine affects only the attraction elements of division and has hardly any effect on the survival of the cell. Colchicine appears to act as a surface action substance and decreases the surface tension of the attraction plasma. Chromosome doubling occurs in the late prophase, under the influence of colchicine, and metaphase is omitted. R. M. I.

741. STRAUB, J. 576.356.5:633
Ergebnisse und Probleme der Polyploidieforschung. (**Results and problems in the study of polyploidy**).
Forschungsdienst 1941 : **12** : 318–24.

In discussing the characters of polyploid plants it is pointed out that in some respects, for instance rate of cell division, chlorophyll content, and osmotic pressure, polyploids are inferior to the diploids. This is more so in the new, artificially produced polyploids than in wild and existing polyploids. F. v. Wettstein has found that in a polyploid moss the increased cell size gradually diminished in the course of generations and finally reverted to that of the diploids; it is suggested that the same process, accompanied possibly by physiological changes, has occurred in the older existing polyploids. Moreover, rate of cell division is itself a character conditioned by genes and it is possible that polyploids of some races of a given plant may have larger cells and others smaller. Existing polyploids may be the result of long continued selection within variable polyploid populations, most of which are moreover hybrid polyploids.
Great advantages are foreseen from a combination of polyploidy with the heterosis characteristic of many hybrids.

INTRODUCTION OF NEW SPECIES 631.524

742. 631.524(72.81)
POPENOE, W. 633.61:575(72.81)
Plant resources of Guatemala.
Chronica Botanica 1942 : **7** : 16–19.

A brief account is given of the vegetation of the country. Among research projects noted as carried out by governmental agencies and private planters are included the improvement of sugarcane cultivation through the introduction of superior varieties. P.O.J. 2878 is replacing other varieties formerly grown, with an increase of almost 100% in yields.

PLANT DISEASES 632

743. WINGARD, S. A. 632–1.521.6:633
The nature of disease resistance in plants. 1.
Bot. Rev. 1941 : **7** : 59–109.

In this first part of a review of the literature on disease resistance in plants, the author discusses after a short introduction the following subjects:—types of disease resistance, misconceptions of disease resistance, the relation of environment to disease development (this section forms a large part of the article, pages 66–87), and the genetic behaviour of disease resistance. There are 295 references in the bibliography.

744. HOLTON, C. S. 632.451.3:576.16:575.11:633.11
Transgressive inheritance of pathogenicity factors in hybrids between the two races of *Tilletia tritici*.
Phytopathology 1942 : **32** : p. 9. (Abst.).

By crossing races T-8 and T-9, 4 hybrids with a range of pathogenicity unknown in any other race have been produced.

745. Holton, C. S. and
Rodenhiser, H. A. 632.451.3:576.16:633.11
New physiologic races of *Tilletia tritici* and *T. levis*.
Phytopathology 1942 : **32** : 117–29.

Five new races are described, bringing the total up to 24 for the two species. Race T-13 arose from T-11 but most other races proved quite stable.

746. 632.452:575.11:633.854.54
Flor, H. H. 632.452:576.16
The inheritance of pathogenicity in a cross between physiologic races 22 and 24 of *Melampsora lini*.
Phytopathology 1942 : **32** : p. 5. (Abst.).

From a cross between race 22 and race 24 of *M. lini* 133 F_2 cultures were obtained and tested for pathogenicity on 17 differential varieties of flax. They yielded 68 physiological races, of which 66 had not been previously isolated. The ability to attack specific varieties or small groups of varieties was inherited in simple mendelian fashion.

747. Quintanilha, A. and
Balle, S. 632.472.3:575.11–181.13
Étude génétique des phénomènes de nanisme chez les Hyménomycètes. (**Genetic study of dwarfing phenomena in the Hymenomycetes**).
Bol. Soc. Broteriana 1940 : **14** : Ser. 2 : 17–46.

Two cases of dwarf mycelium in *Coprinus fimentarius* Fr. are reported, one of which was genetical and the other not. The gene for dwarfing is recessive and is designated *n*; it is independent of the sterility factors *A* and *B*.

ECONOMIC PLANTS 633

748. Vavilov, N. I. 633:582
Entering a new epoch.
Chronica Botanica 1941 : **6** : 433–37.

This article is reprinted from a chapter in "The New Systematics"—see "Plant Breeding Abstracts", Vol. XI, page 64.

749. Boerger, A. 633–1.524(89)
Recursos vegetales del Uruguay. (**Plant resources of Uruguay**).
Chronica Botanica 1942 : **7** : 27–29.

A brief outline is given of the plant resources of Uruguay and of the work being done to utilize and augment them, which includes the services of the La Estanzuela institute of applied botany and the activities of various other research and teaching institutions. Special attention is given to forage plants.
The main pests and diseases of crop plants in Uruguay are enumerated and the article ends with a list of references to further literature.

CEREALS 633.1

750. Smith, D. C. 633.1:575.127.5:633.2
Intergeneric hybridization of cereals and other grasses.
J. Agric. Res. 1942 : **64** : 33–47.

Using the cereal as the female parent, attempts were made to cross common wheat, barley and rye with other genera belonging mostly to the tribe Hordeae and oats with other genera belonging mostly to the tribe Avenae. Hybrid plants were obtained only from the following crosses:—wheat x *Agropyron cristatum*, x *A. elongatum*, x *A. intermedium* and x *A. trichophorum*; and rye x *Agropyron repens*, x *A. sibiricum*, x *A. trichophorum* and x *Secale montanum*.

751. Suneson, C. A. 633.1–2.111:581.46:631.521.6
Frost injury to cereals in the heading stage.
J. Amer. Soc. Agron. 1941 : **33** : 829–34.

The growing of extremely early varieties such as Ramona wheat has presented a new problem in the form of frost damage in the heading stage. Varietal differences in hardiness at this

stage cover only a range of 2° or 3° F. and it is doubtful whether breeding for resistance will be able to solve the problem.
The main damage was done to the anthers but the emasculation thus effected did not lead to the expected increase in natural hybridization.

WHEAT 633.11

752. 633.11:575(77.6)
IMMER, F. R. 633.15:575.12(77.6)
Testing and recommending varieties of field crops in Minnesota.
Chronica Botanica 1942 : **7** : 10–12.

A review of work in progress with wheat and maize hybrids at the Division of Agronomy and Plant Genetics, University of Minnesota, St. Paul, Minnesota.

753. AFANASSJEWA, A. S. 633.11:576.356:537.531
[Comparative investigation of microsporogenesis in wheat (normal and X-rayed)].
Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1941 : No. 2 : 224–43.

For comparison a full study was made of microsporogenesis in 150 florets of normal untreated plants and the results are described. Treatment of the seeds with X-ray doses varying from 250 to 16,000 r. had no effect on microsporogenesis in the resulting plants except with dosages of 8,000 and 16,000 r. A study of 195 florets treated with the latter dosage showed that in some meiosis was normal but about one third displayed irregularities. These included the formation of a certain number of restitution nuclei, followed by dyad formation.
Certain irregularities were observed also in the second division but tetrad formation was usually normal. The pollen grains varied in chromosome number and consequently in size. The plants showing these irregularities were much reduced in yield.

754. VOGEL, O. A. 633.11:581.148:631.521.6:578.08
Relation of glume strength and other characters to shattering in wheat.
J. Amer. Soc. Agron. 1941 : **33** : 583–89.

A new pocket device for measuring the glume strength is described. Observations were made on 8 wheat varieties differing in resistance to shattering. Though the order of the varieties as regards strength did not correspond exactly with their order as regards shattering, yet the 4 varieties classed as susceptible had lower glume strengths than those classed as resistant. Shattering was however also affected by other characters such as shape of ear, length of glume, awning and position of ear. Attention should therefore be given to all these characters in breeding wheats resistant to shattering.

755. LAUDE, H. H. and
SWANSON, A. F. 633.11–1.962.4:575.41
Natural selection in varietal mixtures of winter wheat.
J. Amer. Soc. Agron. 1942 : **34** : 270–74.

The rate at which changes in varietal ratios occur in successive crops after 2 varieties of winter wheat are mixed in the proportion of equal numbers of kernels is reported. One mixture included Kanred and Harvest Queen, the other Kanred and Currell. The rate of change was so rapid in each case as to shift the varietal ratios from the equal proportions of the two paired varieties to nearly pure stands of Kanred in less than 9 years.
Changes in the varietal ratios are attributed to better adaptation and seed production in the surviving variety.

756. TINGEY, D. C. 633.11–2.4–1.521.6:575
A new wheat variety resistant to smut, rust and mildew developed at station.
Fm & Home Sci. 1941 : **2** : No. 4 : p. 12.

The new variety of spring wheat (not yet named), which is resistant to loose and covered smut, rust and mildew, was developed from the cross Hope x Federation.

757. SUNESON, C. A., RIDDLE, O. C. and BRIGGS, F. N. 633.11–2.45–1.521.6:575.12
Yields of varieties of wheat derived by backcrossing.
J. Amer. Soc. Agron. 1941 : **33** : 835–40.

White Federation 38 is the result of bulking 182 F_3 lines showing resistance to stem rust and bunt and obtained from the cross (Martin x White Federation^6) x (Hope x White Federation^5), where the superscript denotes the number of times the parent in question was used in crossing. Under rust epidemic conditions White Federation 38 gave a yield excess varying from 3·8 to 23·2 bushels per acre, and produced normal crops even where adjacent fields of the susceptible parents were so badly damaged that they were not harvested. The same was true of Baart 38, from the cross (Martin x Baart^1) x (Hope x Baart^5).

Under disease-free conditions no differences could be detected between White Federation 38 and the original White Federation in respect of yield, plant height, date of heading or resistance to other diseases. Slight differences detected between Baart 38 and Baart were not significant, though in some instances they closely approached the significant level.

758. HOLTON, C. S. and SUNESON, C. A. 633.11–2.451.3–1.521.6:575(73)
Varietal reaction to bunt in the western wheat region of the United States.
J. Amer. Soc. Agron. 1942 : **34** : 63–71.

A table is given showing the average bunt infection of 83 varieties and selections of winter wheat in tests at 11 localities in the western U.S.A. and one in West Virginia from 1932 to 1940. No variety was bunt-free at all stations, 7 averaged less than 0·1% bunt and 36 less than 10%. The 5 varieties Ridit, Relief, Turkey-Florence (C.I. 10080), Hussar and Hohenheimer were involved as parents in the origin of 26 of the 27 most resistant hybrid selections.

759. RODENHISER, H. A. and HOLTON, C. S. 633.11–2.451.3–1.521.6:581.02
Variability in reaction of wheat differential varieties to physiologic races of *Tilletia levis* and *T. tritici*.
Phytopathology 1942 : **32** : 158–65.

Certain wheat varieties, such as Marquis, gave varying reactions in different localities as regards some physiological races while remaining constant in their reaction to other races. Thus tests for varietal resistance should not be confined to a single area.

760. STAKMAN, E. C. and LOEGERING, W. Q. 633.11–2.452:576.16(73)
Recent changes in prevalence of physiologic races of *Puccinia graminis tritici* in the United States.
Phytopathology 1942 : **32** : p. 17. (Abst.).

The trends in the prevalence of different races since 1939 suggest that Thatcher wheat should retain its resistance in the spring wheat region but that stem rust may again become important in the *durum* wheat region.

761. PHILP, J. 633.11–2.452–1.521.6:575(62)
A new wheat variety "Mabrook".
Egypt. Agric. Rev. 1941 : **19** : Part 4 : 280–84.

The new variety, Mabrook (formerly known as Giza 121), was derived from an interspecific cross between Giza Seven (which arose from a cross between Federation and an Indian variety, number 7) and Beladi Forty-two (a selection of *T. pyramidale*). The new variety and the agricultural characters are described. Mabrook from a practical viewpoint is very resistant to black rust, its grain and yield being scarcely affected by an attack of this rust.

762. SHANDS, R. G. 633.11–2.452–1.521.6:575.127.2
Disease resistance of *Triticum timopheevi* transferred to common winter wheat.
J. Amer. Soc. Agron. 1941 : **33** : 709–12.

Crosses were made between *T. Timopheevi* and a number of varieties of *T. vulgare*; the hybrid seeds germinated more successfully when *T. vulgare* was used as seed parent. From 6,600

selfed flowers of F_1 plants only 23 grains were obtained. By pollinating with *T. vulgare* however one fertile F_2 plant was obtained, giving rise to 16 F_2 plants which were fertile and very vigorous. Segregation occurred in the F_4 generation for resistance to leaf and stem rust and for morphological type; the most resistant plants were selected and bulked. Further selection was carried out in succeeding generations for resistance to rust and also to mildew. Several *T. Timopheevi* characters have appeared in the progenies, as well as certain characters not found in either parent; all the selections are winter types; some have good agronomic appearance and indications of good yielding capacity. All are completely fertile and root tip counts show a somatic chromosome number of 42.
Several of the hybrid selections were crossed with other varieties of *T. vulgare*; in the hybrids with Marquis certain chromosome irregularities were occasionally observed, leading to a higher percentage sterility than is found in Marquis.

763. Granate, L. 633.11:664.641.016:575(49.8)
Studiul grâului din experienţe cu soiuri şi lucrări culturale prin metoda farinografului Brabender. (**The study of wheat by the Brabender farinograph method in variety tests and cultural tests**).
Viaţa Agric. 1941 : **32** : 200–04.

The effects of various cultural measures on the yield and quality were studied. Farinograph tests were made on certain selections of the wheat American 15 which had proved superior in such respects as yield, earliness, resistance to frost and disease, etc. Two of the selections gave quality coefficients in excess of the initial strain; thus American 15 -17 gave a coefficient of 80 in 1939 against 71 for American 15 and 89 in 1940 as against 83; this selection was also superior to American 15 in rust and frost resistance and in yield; it ripened 3 days earlier and is the only line that combines superior quality with high nitrogen content. Mentana, the only variety that surpassed it in earliness, was much below it in quality.
Selections of American 26 were all low in quality.

OATS 633.13

764. Stanton, T. R. 633.13:575(73)
Registration of varieties and strains of oats, XI.
J. Amer. Soc. Agron. 1942 : **34** : 275–79.

The strain of *Avena byzantina* considered is Otoe, characterized by early maturity, resistance to stem rust, high yield, and straw stronger than that of Brunker.
Other oat varieties noted (specific name not given) are Tama (early maturing, high yielding and resistant to nearly all physiological races of crown and stem rust, and to oat smut) and Marida (resistant to most physiological races of oat-smut occurring in the Northwestern States).

765. Taborda de Morais, A. 633.13:582(46.9)
Estudos nas aveias II. As aveias portuguesas da secção *Euavena* Griseb. (**Studies in oats II. The Portuguese oats of the section *Euavena* Griseb.**).
Bol. Soc. Broteriana 1938–39 : **13** : Ser. 2 : 573–709.

The author here presents the complete results of his study of the section (cf. "Plant Breeding Abstracts", Vol. VI, Abst. 1233). He discusses certain points in which he disagrees with Malzev and various other authors.
Almost all types that have been previously described are found in Portugal, and the author comes to the conclusion that the types are mostly the product of segregation. Many of the segregates have become stabilized and perpetuated in nature. A new classification is advanced where these hybrid forms are given equal rank with non-hybrid forms and the entire section is divided up into species, subspecies, varieties, subvarieties and forms. These are arranged in a table for purposes of comparison, and also in the form of a diagnostic key. They are described in Latin in the text and illustrated in a series of 20 excellent photographic plates. There is also an alphabetical index to the species, subspecies, varieties, subvarieties and forms.

766. Murphy, H. C.,
Stanton, T. R. and
Coffman, F. A. 633.13–2–1.521.6(73)
Breeding for disease resistance in oats.
J. Amer. Soc. Agron. 1942 : **34** : 72–89.

The greater part of this review of progress in breeding disease-resistant oats in the U.S.A. is concerned with work on the major diseases, loose and covered smut and crown and stem rust. Indications are given of the losses caused, the sources of resistance are discussed and the progress in producing improved varieties incorporating resistance to these diseases singly and together is described. A table is given showing varieties and selections resistant to the smuts, to stem rust, to the smuts and stem rust, to the smuts and crown rust and to the smuts, stem rust and crown rust.

Varietal resistance to the minor diseases has been reported and it should therefore be possible to breed resistant varieties.

767. Coffman, F. A. 633.13–2.111–1.521.6
The comparative winter hardiness of oat varieties.
Circ. U.S. Dep. Agric. 1941 : No. 622 : Pp. 35.

Winter survival data for oat varieties are given for 1 to 10 years experiments at 32 State agricultural experiment stations—the data cover a total of 179 station years. Hairy Culberson (C.I.2505) survived the best on the average, followed by Bicknell, Culberson (C.I.273) and Fulghum (winter type, C.I.2499). Two typical strains of Winter Turf, formerly considered the most hardy winter oat, ranked fifth and seventh of 12 varieties grown in all tests. Fulghum (winter type, Term. sel. 090, C.I.3175) appeared to be exceptionally hardy but it was only tested for a short period.

The hardy varieties, Hairy Culberson, Culberson, Bicknell and Fulghum, all probably resulted from hybrids between the two species, *Avena sativa* and *A. byzantina*. Markton, a non-hardy spring oat, when crossed with Red Rustproof, produced hybrids that were more hardy than Red Rustproof (these hybrids were, however, less hardy than some of the varieties).

The effect of different types of winters on winter-killing is discussed.

768. Kingsolver, C. H. 633.13–2.3–1.521.6:575
Reaction of varieties and selections of oats to *Pseudomonas coronafaciens*.
Phytopathology 1942 : **32** : p. 12. (Abst.).

Observations are given on the resistance of varieties and of groups of lines from certain crosses. Almost all selections of D69 x Bond were outstanding in freedom from *Pseudomonas* infection and are also resistant to most races of the rusts and smuts.

769. Reed, G. M. and
Stanton, T. 633.13–2.451.2:576.16:631.521.6
Susceptibility of Lee x Victoria oat selections to loose smut.
Phytopathology 1942 : **32** : 100–02. (Abst.).

Victoria and a number of selections from the cross Lee x Victoria, while resistant to all other races of smut, have been attacked to different degrees by a new race of *Ustilago Avenae*, A–30, discovered at Stillwater, Oklahoma in 1934. The selections include the varieties Lega, Levic, Letoria, Lenoir, Lelina and Stanton.

Selections from a cross of Victoria with Hairy Culberson have also been attacked by the new race, but selections from crosses with Fulgrain, Norton and Nortex proved resistant. Other resistant varieties have been found and further tests are needed.

770. Stanton, T. R. and
Murphy, H. C. 633.13–2.451.2–1.521.6:575(73)
Field studies of smut resistance in oats.
J. Amer. Soc. Agron. 1942 : **34** : 248–58.

Extensive hybridization experiments have been conducted in an attempt to transfer to leading commercial types of oats the high resistance of varieties such as Markton, Black Mesdag and Navarro to species of *Ustilago*. A tabulation is presented of average infection in 68 smut-resistant varieties and selections and 7 check varieties of oats grown at several experiment stations.

The cross between Victoria and Richland was most resistant.

771. Coffman, F. A., 633.13–2.452–1.521.6:575
Humphrey, H. B. and 633.13–2.451.2–1.521.6:575
Murphy, H. C. 633.13–2.111–1.521.6:575
New red oats for fall seeding resistant to rusts and smuts.
J. Amer. Soc. Agron. 1941 : **33** : 872–82.

The introduction of Victoria and Bond and the discovery of their crown rust resistance and the discovery of the importance of stem rust have had important effects on the breeding of winter oats for the southern United States. From the crosses Victoria x Nortex and Victoria x Fulghum thousands of selections have been tested for winter-hardiness, yield and other agronomic characters and for resistance to crown rust and smut at Arlington, Va., Ames, Iowa and at co-operating stations. Ranger, Rustler and Fultex were produced in this way. They are resistant to crown rust and smut but not to stem rust. Fultex is outstanding in winter-hardiness. To produce a wi iter-hardy variety resistant to stem rust, crown rust and smut, Red Rustproof strains were in 1934 crossed with a segregate from Victoria x Richland. Tests at different centres suggest that a few of the thousands of selections grown combine the stem rust resistance of Richland, the crown rust and smut resistance of Victoria and the hardiness and other valuable features of Red Rustproof. Promising selections are also expected from crosses of the red oats Fulghum and segregates from Fulghum x Markton (including Fulton) with Victoria x Richland segregates. J. L. F.

772. Weetman, L. M. 633.13–2.452–1.521.6:575.11
Genetic studies in oats of resistance to two physiologic races of crown rust.
Phytopathology 1942 : **32** : p. 19. (Abst.).

Inheritance studies on the reaction of Bond (resistant to race 1, susceptible to race 45), Victoria (resistant to both 1 and 45) and Mutica Ukraina (resistant to 45 and a portion of race 1) indicate that the resistance of Bond to race 1 is due to two dominant complementary genes, that the resistance of Victoria to both races is due to a single gene distinct from the Bond genes and that the resistance of Mutica Ukraina to the greater part of race 1 is due to two dominant complementary genes which are probably allelomorphic to the Bond genes for resistance.

MAIZE 633.15*

773. Abbe, E. C. and
Phinney, B. O. 633.15:575–181.12:581.143.26
The action of the gene dwarf$_1$ in the ontogeny of the stem in maize.
Genetics 1942 : **27** : p. 129. (Abst.).

Dwarf maize plants (d_1d_1 in constitution) have a lower rate of increase in length of stem and mature more slowly than do normal plants. Cell division takes place more slowly in the dwarf and at maturity it is found that the cells of the dwarf have not elongated as much as those of normal plants. At one phase of growth, however, cell enlargement appears to be greater in dwarf plants than in normals.

774. Neal, N. P. 633.15:575"793"(77.5)
Wisconsin corn hybrids 1941.
Spec. Circ. Wis. Coll. Agric. Ext. Serv. 1941 : March : Pp. 12.

Wisconsin strains of hybrid corn are classified to correspond with relative maturity zones, which, it is noted, are to be regarded as only relative. A map indicating the zones is presented and there is a tabulation of performance trials showing average yields of grain and silage that may be expected from hybrids as compared with open-pollinated varieties of comparable maturity.

775. Rhoades, M. M. 633.15:575.116.1:575.116.7
Different rates of crossing over in male and female gametes of maize.
J. Amer. Soc. Agron. 1941 : **33** : 603–15.

In an earlier study (see "Plant Breeding Abstracts", Vol. VII, Abst. 653) it was reported that crossing-over in the *Bm–Pr* region of chromosome 5 was higher in plants hyperploid for the telocentric chromosome than in diploid plants. Further investigations have shown that

* See also Abst. 752.

the difference lay in a differential cross-over rate between male and female gametes, the figures for hyperploid plants having been obtained all from male and those for diploids all from female gametes. A considerable body of evidence is presented in the present paper, showing that in each of the 16 heterozygous individuals studied the cross-over percentage in chromosome 5 was higher in the male than the female gametes, the differences ranging from 1 to 18·2%. No such differences were found in respect of characters in the other chromosomes.
The regions used were A_2–*Bt*, A_2–*Bm*, *Bt*–*Pr* and *Bm*–*Pr*, all close to the centromere. It is suggested that only regions adjacent to the centromere show sex differences, which would account for the failure of earlier investigators to detect the difference.

776. Murphy, R. P. 633.15:575.12
Convergent improvement with four inbred lines of corn.
J. Amer. Soc. Agron. 1942 : **34** : 138–50.
The method of convergent improvement involving double back-crossing is a means of improving each of two parental inbred lines of a single cross without modifying the yielding ability of that cross. (See Richey, American Naturalist 1927 : **61** : 430–49). It has been possible by this process in recovered lines to effect improvement in vigour, in resistance to smut and lodging and in soundness of ear if these characteristics were lacking in the original lines.
Tabulated data are supplied on yields from crosses of recovered lines to the recurrent and non-recurrent parents, and from recovered lines, selected for intercrossing, when tested in crosses with the recurrent and non-recurrent parents.

777. Delwiche, E. J. and Strommen, A. M. 633.15:575.12"793"
Corn for Northern Wisconsin.
Spec. Circ. Ext. Serv. Coll. Agric. Univ. Wis. 1941 : April : Pp. 4. (Mimeographed).
There is need for early corn varieties in Northern Wisconsin. Work which was started in 1923 has resulted in the development of hybrid strains (Wisconsin Nos. 255, 275 and 279) which mature a week or more earlier than hybrids from other sources. These have been released for commercial production, and range in relative maturity from 80 to 85 units as compared with other Wisconsin hybrids which have a relative maturity of 90 to 120.
Trials on the production of early Wisconsin hybrids for silage are also reported. When corn is intended for silage purposes, a variety that is later by 5 or 10 relative maturity units than that required for grain may be grown.

778. Roberts, L. M. 633.15:576.356.2
The effects of translocations on growth in *Zea mays*.
Genetics 1942 : **27** : p. 166. (Abst.).
Experiments were carried out to determine whether position effects of rearranged chromosomes could be detected in inbred maize strains. Significant small differences were found by a statistical study of such characters as time of flowering, height, diameter of stalk, and width and length of leaf. Thus one homozygous translocation involving three chromosomes averaged two days earlier in shedding its pollen and had a significantly larger stalk diameter than the strain from which it was produced. The chromosome rearrangements were produced by X-rays.

779. Roman, H. 633.15:576.356.2:576.312.341
Translocations involving "B" chromosomes in maize.
Genetics 1942 : **27** : p. 167. (Abst.).
Seven translocations between normal (or A) chromosomes and B chromosomes and one between two B chromosomes were produced by X-ray treatment of pollen from maize plants containing B chromosomes. The points of breakage in the A and B chromosomes have been determined for these translocations.

780. Randolph, L. F. 633.15:576.356.5:575.125:581.162.5
The influence of heterozygosis on fertility and vigor in autotetraploid maize.
Genetics 1942 : **27** : p. 163. (Abst.).
Pronounced decreases in vigour and fertility were found when inbred strains of maize were doubled, while tetraploids derived from stocks that have not been inbred were as vigorous or

more vigorous than their diploid parents and highly fertile. It is pointed out that the deleterious effect of doubling the number of homozygous genes at each locus in the tetraploids derived directly from the inbreds and the absence of the effect in the heterozygous tetraploids suggest that homozygosity in itself is a significant cause of the reduction in vigour which accompanies inbreeding and conversely, that heterozygosity in itself may be responsible for much of the vigour or heterosis exhibited by tetraploids.

781. Clark, F. J. 633.15:581.331.2:576.356
Preliminary investigations in *Zea mays* of the germination capacity of pollen with aberrant nuclei.
Genetics 1942 : **27** : p. 137. (Abst.).

The germinating capacity of pollen grains from maize plants homozygous for the recessive factor *dv* for divergent spindle (see "Plant Breeding Abstracts", Vol. XI, Abst. 133) was investigated. It is concluded that pollen germination does not require a normal morphological organization of the pollen grain (one vegetative cell and nucleus and two sperm cells with one nucleus each) nor the inclusion within a single nucleus of all the chromosomes of the vegetative cell.

782. Tavčar, A. 633.15:581.48:575.12
Svojstva prve sjemenske generacije od sitnozrnih i krupnozrnih genotipova kod kukuruze—*Zea Mays* L. (**The immediate effect of crossing of small and large seeded genotypes on the character of kernels of *Zea Mays* L.).**
Poljopr. Naučna Smotra, Zagreb 1940 : **2** : 77–96.

The results of earlier workers on the influence of cross-pollination on the size and weight of maize grain are summarized.

A number of crosses between large and small grained forms were made, the parental genotypes being chosen in such a way that, being themselves colourless, they gave hybrid grains with violet aleurone. The seed parent was pollinated with a mixture of its own pollen and that of the pollen parent; the hybrid seed could be distinguished from the selfed seed by its colour. Each parent was also selfed.

Eighty different crosses were studied involving the following combinations:—

(a) *Z. Mays indurata microsperma* x *Z.M. indurata macrosperma.*
(b) *Z.M. indurata microsperma* x *Z.M. indentata.*
(c) *Z.M. everta* x *Z.M./indurata macrosperma.*
(d) *Z.M. everta* x *Z.M. indentata.*

The main cob was taken from each treated plant and 30 grains taken from the central portion of the cob. Measurements were made of the 1,000 corn weight and weight of pericarp, embryo and endosperm and of the volume of the grain. The weights were calculated on a basis of 12% water content; the pericarp weight was calculated by subtracting the weight of embryo and endosperm from the grain weight; the volume of the grain was determined on 100 grains and the value for one grain calculated from that. The pericarp weight of the selfed maternal seed was taken as the theoretical value, the arithmetic means of the selfed male and female parents as the theoretical for embryo weight, and for the endosperm $\frac{2}{3}$ of the weight of the selfed female + $\frac{1}{3}$ of that of the selfed male parent, so as to conform to the proportion of the chromosomes. The theoretical weight of 1,000 grains was calculated by adding the theoretical weights of embryo, endosperm and pericarp. The theoretical volume of the grain was calculated by adding $\frac{2}{3}$ of the volume of the selfed grain of the female to $\frac{1}{3}$ that of the male parent.

The differences between the theoretical values and those obtained are shown in tables.

The weight of the grain and of the various components was higher in the crossed seed than in selfed seed when the small seeded parent served as seed parent and lower with the larger seeded form as seed parent.

Since the differences between theoretical and experimental values were very small it is concluded that the characters in question are conditioned by polymeric genes.

When the small grained form was the seed parent the weight of pericarp was somewhat higher than in the selfed seeds but the percentage of pericarp was lower and such seeds often burst, especially when the difference in size of the two parents was very great.

783. Lindstrom, E. W. 633.15:581.481:581.149:575.11
Inheritance of seed longevity in maize inbreds and hybrids.
Genetics 1942 : **27** : p. 154. (Abst.).
Embryo longevity of maize varies to a marked degree and is definitely heritable. Hybrid seed of long-lived x short-lived parental inbreds was long-lived (often with significant differences in reciprocal crosses). Results from selfing varieties for one generation suggest that in some cases the number of genes for longevity is not large.

784. Shafer, J. (jun.) and
Wiggans, R. G. 633.15–1.557:578.08
Correlation of total dry matter with grain yield in maize.
J. Amer. Soc. Agron. 1941 : **33** : 927–32.
Using data derived from replicated tests of single crosses, double crosses and top crosses in different years, the author shows that there is a correlation (average $r = 0{\cdot}7249$) between total dry weight and weight of dry grain. Grain yield could therefore be used as a preliminary test in breeding maize for silage, though there is evidence that it would be better confined to populations derived from a wide range of parents. J. L. F.

785. Kvakan, P. 633.15–2.112–1.521.6:575.12
Prirod križanaca kukuruza I. generacije u Maksimiru godine 1939. (**The 1939 Maksimir hybrid corn yield test**).
Poljopr. Naučna Smotra, Zagreb 1940 : **2** : 120–30.
Partial crop failures in maize are not infrequent in Jugoslavia on account of low soil moisture. Thus in 1935, a dry year, the average yield was only 12·2 c. per ha., as compared with 19·8 c. in 1937, which was a moist year.
Yield of grain per plant was determined in 1938 and 1939 for a number of crosses and the figures are presented in tabular form. All combinations yielded more in 1939 than in 1938, when they were somewhat more closely spaced. All yielded more than commercial uncrossed seed, which moreover showed little or no response to the wider spacing of 1939. The year 1939 was much less favourable for growth, on account of its lower rainfall, and the hybrids are thus seen to be more drought resistant.
Observations on the performance of the hybrids showed that some of them would make valuable crops for grain production and others for silage.

786. 633.15–2.3–1.521.6:575
Elliott, C. 633.15–2.7–1.521.6:575
Bacterial wilt of dent corn inbreds.
Phytopathology 1942 : **32** : 262–65.
Young dent-corn plants are apparently more resistant to bacterial wilt (resulting from feeding injury due to the corn flea beetle, *Chaetocnema pulicaria*) than those of sweet corn. Preliminary tests of the reaction of inbred lines of dent corn have been made at the Arlington Experimental Farm. There are differences in resistance of the inbreds which indicate possibilities for the development of resistance in dent corn hybrids.

787. Ho, W.-C. and
Koepper, J. M. 633.15–2.411.4–1.521.6:575.1
Host response of maize seedlings to *Pythium graminicolum*.
Phytopathology 1942 : **32** : p. 9. (Abst.).
The reaction of open-pollinated varieties, inbred lines, single crosses and double crosses to *P. graminicolum* in field and greenhouse was studied over a period of 3 years. Wide variations were observed. The inbred lines Ldg (K), Black 349, Lancaster 289, Osterland 426 and Hy showed some resistance and single crosses combining these lines were, in general, the most resistant of the single crosses tested.

788. Hoegemeyer, L. C. 633.15–2.7–1.521.6:575.125
An association of root injury by white grubs, *Phyllophaga* spp., and lodging of crossbred strains of corn.
J. Amer. Soc. Agron. 1941 : **33** : 1100–07.
An attack of white grubs (*Phyllophaga* spp.) gave the opportunity for the study of the resistance of maize hybrids to such an attack—six inbred lines (all of which originated from the Pride

of Saline variety), their 15 possible single-crosses and 29 of the 45 possible double-crosses were in the experiment. The roots of the inbred lines were not visibly damaged by white grubs and suffered only very minor amounts of lodging. The single-crosses and double-crosses, however, differed significantly in the percentages of their plants that were root lodged and these differences in lodging seemed to be a manifestation of differences in root injury by white grubs. The six parent lines differed markedly in the average percentage of lodged plants in the single-crosses of which they were parents.

BARLEY 633.16

789. HAYES, H. K. 633.16:575(73)
Barley varieties registered, VII.
J. Amer. Soc. Agron. 1942 : **34** : 281–82.

The varieties recorded are Beecher (a new dry-land barley of promise for the highland section of the Central Great Plains), Lico (a stiff-strawed smooth-awned, six-rowed variety with a medium lax head), and Texan (resistant to mildew and moderately resistant to net blotch under field conditions).

790. 633.16:576.356
SMITH, L. 633.16:576.356.5
An inversion, a reciprocal translocation, trisomics, and tetraploids in barley.
J. Agric. Res. 1941 : **63** : 741–50.

Descriptions are given of meiosis in barley plants heterozygous for an inversion, in trisomic plants and in tetraploid plants. Examination of a number of mutants and varietal hybrids revealed a meiotic disturbance as characteristic of only one mutant.

791. POPE, M. N. 633.16:581.142:578.08
Artificially induced vivipary in barley.
J. Amer. Soc. Agron. 1941 : **33** : 850–51.

By removing the lemma and inserting filter paper which was kept moistened it was possible to induce germination and secure transplantable seedlings 15 to 20 days after flowering.

792. LEONARD, W. H. 633.16:581.46:575.11
Inheritance of reduced lateral spikelet appendages in the Nudihaxtoni variety of barley.
J. Amer. Soc. Agrón. 1942 : **34** : 211–21.

Certain varieties of the species *H. intermedium* breed true for fully fertile lateral spikelets while others are homozygous for only partial fertility. Nudihaxtoni has all spikelets fertile, but has awnless lateral spikelets.

The relation of lateral spikelet fertility to reduced appendages is studied. The constitution of the variety is *vvll* (*vv* = non-six row v. six row and *ll* = intermedium v. non intermedium). There is also present a further factor for the reduction of the appendages on the lemmas of the lateral spikelets designated as normal v. reduced (*Lr*, *lr*) and this is recessive in Nudihaxtoni, but dominant in ordinary 6-row varieties. The normal v. reduced condition is apparently due to a single factor difference. (See also "Plant Breeding Abstracts", Vol. VIII, Abst. 850). There is also evidence that the factor pair for normal v. reduced lateral spikelet appendages *Lr*, *lr*) is linked with the one for green v. orange seedling colour (*Or*, *or*), with a recombination value of 38·58=1·20% obtained from F_3 data.

793. TAVČAR, A. 633.16:581.46:575.11
Otpadanje osja kod ječma *Hordeum sativum* L.—nasljedjivanje i bilinogojska važnost. (**Deciduous awn in *H. sativum* L., its inheritance and importance in breeding**).
Poljopr. Naučna Smotra, Zagreb 1939 : **1** : 51–65.

The experiments of various authors are cited to show that removal or absence of the awns in barley reduces the transpiration and the yield of grain. At the same time the author points out the disadvantages of the awn on mature ears and suggests the desirability of obtaining a barley in which the awns fall off as the ear ripens. A pure line of *H. hexastichum* with such deciduous awns has been selected and crossed with forms of *H. distichum* and *H. vulgare*.

Observations were made on the parents in respect of length and number of rachis segments, the length of the awn on the central and lateral spikelets, the number of stomata on the awn and its content of ash and dry matter. The awns were 1–2 cm. shorter in *H. hexastichum* than in the other two species. The awn in the deciduous forms develops and functions normally until the ear is ripe, when it becomes brittle and easily falls off, especially in dry seasons. The ash and dry matter content of the brittle awns is higher than that of persistent awns. Four crosses were made, two with *H. vulgare* and two with *H. distichum*; in all cases persistent awn was dominant to deciduous in the F_1. The F_2 results are given and show monohybrid ratios; thus in the first cross with *H. distichum* there were 666 persistent: 233 brittle. This segregation was however not independent of that of number of rows and the two were found to be linked, with 17·449% crossing-over. Plants of *H. distichum* with brittle awns were selected from the F_2 generation and bred true in F_3.
In the second cross with *H. distichum* there were 398 plants with persistent and 118 with brittle awns in the F_2. In this case the crossing-over between the gene for persistent awns and that for two rows was 15·323%. Again the two-rowed brittle F_2 plants selected bred true in F_3.
In the first cross with *H. vulgare* the ratio was 325 persistent : 98 brittle, with 16·56% crossing-over. In the second cross the ratio was 487 : 149, with 14:557% crossing-over. In both crosses *H. vulgare* plants with brittle awns bred true in the F_3.
The gene for brittle awn is designated lk_u.

794. Woodward, R. W. and Tingey, D. C. 633.16–2.451.2–1.521.6:578.08
Inoculation experiments with covered smut of barley.
J. Amer. Soc. Agron. 1941 : **33** : 632–42.

Various methods of artificial infection were tested and the results are described.
There was no evidence of the existence of more than one strain of the fungus. The reaction of 39 varieties was studied and 16 of them remained unaffected; the varieties most commonly grown in Utah, Winter Club and Trebi, proved susceptible, but a new variety Velvon was highly resistant.
The cross Union Beardless and Winter Club showed 33% of infection in the F_3 and Winter Club x Colorado 3063 showed 12·2%. Though the infection was light it is thought possible that resistant strains can be produced in this way.

MILLETS AND SORGHUM 633.17

795. Lindenbein, W. 633.174:576.16
Ursprungszentrum, Kulturstromverbreitung und Einzelwanderung bei Kultivierten *Andropogon*-Arten. (**Centre of origin, distribution trends and migration of individuals in the cultivated *Andropogon* species**).
Engl. Bot. Jahr. 1940 : **71** : 337–64.

The histories of *Andropogon Sorghum* up to the present, are very contradictory and India, tropical Africa and most recently, according to Vavilov, China have been named as the country of origin of the species. The repeatedly used gene-centre theory represents indeed also as does the doctrine of cultivation trends, a valuable extension of the method for the historical investigation of our cultivated plants but does not suffice for the uninterrupted development of the tropical millet species. On the one hand one must reckon with marked changes in climate and agriculture since the beginning of cultivation and on the other, the earliest movements of peoples are insufficiently known and their traces covered by later migrations. It is clear that with regard to sorghum cultivation, a polytope or at least a ditope origin is conceivable and would correspond to the latest results of cytogenetical researches. R. M. I.

RICE 633.18

796. Jones, J. W. and Pope, M. N. 633.18:581.162.5:575.1
Adventitious roots on panicles of rice.
J. Hered. 1942 : **33** : 55–58.

When *Oryza sativa* plants from seed of a partly sterile strain of Caloro were crossed with normal Caloro there was segregation in a ratio of three normal plants to one partly sterile, some of which produced small roots on the panicles.

797. Douglas, W. A. and Ingram, J. W. 633.18–2.7–1.521.6
Rice-field insects.
Circ. U.S. Dep. Agric. 1942 : No. 632 : Pp. 32.
Differences in varietal infestations of *Oryza* species by stalk borers (*Diatraea saccharalis* or *Chilo plejadellus*) have been studied at the Rice Experiment Station, Crowley, La. There is evidence that susceptibility to borer injury varies more with size of stalk than with depth of stalk coloration.

FORAGE GRASSES 633.2

798. Krishnaswamy, N. 633.2:576.312
Untersuchungen zur Cytologie und Systematik der Gramineen. (**Investigations on the cytology and systematics of the Gramineae**).
Beih. Bot. Zbl. 1940 : **60** : 1–56.
The karyological researches of the author on eight genera of the *Andropogoneae*, *Paniceae* and *Chlorideae*, taken in connexion with the results of earlier investigations, show that in these three families, the basic numbers 9–10 prevail and numerous high polyploid series also occur. Two series stand out: with the basic number 10: *Themeda*, *Cymbopogon*, *Andropogon* (Andr.); *Paspalum* (Pan); *Bouteloua*, *Cynodon*, *Trichloris*, *Spartina*, *Chloris*, *Dinebra*, *Buchloe* (Chlor.); —with the basic number 9: *Miscanthus*, *Arundinella* (Andr); *Eriochloa*, *Tricholaena*, *Panicum*, *Oplismenus*, *Setaria*, *Pennisetum* (Pan); *Eleusine* (Chlor). Among the *Chlorideae* there are also the *Dactyloctenium* with 12 and the *Beckmannia* with 7.
The author accordingly suggests two developmental directions for the karyotype with regard to these three families derived from forerunners with the basic number 12 or 6 as in the *Bambuseae* and moreover comes to the conclusion that the *Chlorideae* are not to be placed between *Festuceae* and *Hordeae* (both with the basic number 7) but near to the starting point of a natural group (*Sacchariferae* Avdulov) with *Paniceae*, *Andropogoneae* and possibly also *Maydeae*. The *Paniceae* genus, *Paspalum*, approaches the *Andropogoneae* in karyotype. The "A" chromosome pair of *Sorghum* is not found again in any other group of *Andropogon* s. lat. from which the author draws the conclusion that the genus *Sorghum* is probably monophyletic and the cultivated species are derived from wild species of the same genus with $2n = 10$. *Eleusine coracana*, as comparative investigations of meiosis show, probably originates from *E. indica* by a doubling of the genom and increase in the chromosome size.
In the two sterility types of *E. coracana* investigated, the agglutination of the pollen shows a suppression of spindle formation at meta- and anaphase, which the author considers to be the cause of the sterility. No disturbance of meiosis was established in connexion with "gappiness" and this phenomenon, according to the author, is probably caused by various Mendelian factors. R. M. I.

799. Brittingham, W. H. 633.21:581.16:575.2
The nature and extent of variation in Kentucky bluegrass as criteria for apomictic seed formation.
Genetics 1942 : **27** : 134–35. (Abst.).
Morphological and cytological studies have shown that seeds in *Poa pratensis* are produced by the apomictic development of reduced eggs, by the fertilization of reduced eggs by reduced pollen, by the fertilization of unreduced eggs by reduced pollen and by the apomictic development of unreduced eggs derived from cells of the nucellus by apospory. The seed setting under bags, the amount of variation in selfed progenies and the occurrence of polyembryony were studied.

800. Myers, W. M. 633.22:576.356.5:575.11.061.634
Genetical consequences of the chromosomal behavior in orchard grass, *Dactylis glomerata* L.
J. Amer. Soc. Agron. 1941 : **33** : 893–900.
Since *Dactylis glomerata* behaves cytologically as an autotetraploid (cf. "Plant Breeding Abstracts", Vol. X, Abst. 460) it is expected to show tetrasomic inheritance. The author presents data, on first and second inbred generations segregating for chlorophyll deficiencies, to show that tetrasomic ratios are obtained. It was not always possible to decide what type of tetrasomic segregation was occurring. J. L. F.

801. Myers, W. M. 633.263:576.356
Variations in chromosomal behaviour during meiosis among plants of *Lolium perenne* L.
Cytologia 1941 : **11** : 388–406.

Details are given of minor chromosomal irregularities and the relations of these irregularities in different stages of the meiotic divisions of plants of *L. perenne.*
Statistically significant differences are shown in total chiasma frequency, frequency of terminal chiasmata and number of open bivalents per sporocyte.
Data are given of the presence of univalents, non-oriented bivalents and loosely attached bivalents in metaphase I sporocytes and their correlation coefficients of chiasma frequency and degree of terminalization.
In 13 of the 17 plants examined, one or more lagging univalents are noted and their relation to the conditions at metaphase is discussed. The data on the frequency of micro-nuclei in the sporocyte at metaphase I, showed that most of the chromatids are included in the daughter nuclei. Details are also given of the types of tetrads. R. M. I.

802. Saura, F. 633.266:576.312.35
Cariología de algunas especies del género *Paspalum.* (**Karyology of certain species of the genus *Paspalum.***)
Inst. Genét., Fac. Agron. Vet., Univ. B. Aires 1941 : **2** : 41–48.

By means of the acetocarmine method the chromosome numbers have been determined in 11 species of *Paspalum.* In *P. Haumanii* and *P. quadrifarium* $n = 10$, in *P. distichum* $n = 30$ and *P. epilis* and possibly *P.* aff. *alcalinum* $n = 40$. In the other species examined $n = 20$, namely in *P. simplex, P. unispicatum, P. plicatulum, P. commune, P. Hieronymi* and *P. cromyorrhizon.*
Differences between the species were observed in respect of diameter of the microsporocytes, the species with the higher chromosome number having the higher values.

803. Karper, R. E. 633.282:575(73)
Registration of improved sorghum varieties, III.
J. Amer. Soc. Agron. 1942 : **34** : p. 280.

The variety described is Norkan, an early maturing forage sorghum originated and distributed from the Fort Hays Experiment Station, Hays, Kansas.

804. Andrés, J. M. 633.289:576.312.35
Número de cromosomas en las especies del género *Hordeum* espontáneas en los alrededores de Buenos Aires. (**Chromosome numbers in the wild species of the genus *Hordeum* in the vicinity of Buenos Aires**).
Rev. Fac. Agron. B. Aires 1941 : **9** : 100–08.

Chromosome determinations were made on *H. chilense* Brongn., *H. pusillum* Nutt. var. *typicum, H. pusillum* Nutt. var. *euclaston* (Steudel) Hauman and *H. murinum* L. subsp. *leporinum* Link Rich by the acetocarmine method. Comparisons were also made of the dimensions of the microsporocytes.
All species studied had $n = 7$ except *H. murinum* subsp. *leporinum* (Link) Rich., where $n = 14$. No meiotic irregularities were observed.

LEGUMINOUS FORAGE PLANTS 633.3

805. Rudorf, W. 633.313
Eine *unifoliata*-Mutante bei *Medicago media* Perss. (**A *unifoliata* mutant in *M. media* Perss.**).
Züchter 1941 : **13** : 272–74.

Plants bearing exclusively undivided leaves found in 1940 in the progeny of a plant treated with 0·1% colchicine are described. The plants showed various floral anomalies and were both male and female sterile. The entire progeny consisted of 114 plants, of which 22 were *unifoliata* types. Root tip counts showed the normal number $2n = 32$ in the mutant plants.

806. Atwood, S. S. 633.322:581.162.5:575.113.3
The multiple oppositional alleles causing cross-incompatibility in *Trifolium repens.*
Genetics 1942 : **27** : 129–30. (Abst.).

In order to determine the number of oppositional alleles (S_1, S_2, S_3 etc.) in two series of *T. repens*

plants (17 and 10 individuals respectively), each plant was crossed with a homozygous plant (S_1S_1) and the progenies from these crosses were investigated. The results showed that at least each of 26 of the 27 parents (only 5 F_1 plants were tested from the 27th parent) carried two different alleles. Further tests were then made by breeding from these F_1 plants (this included crossing them with a further 6 plants homozygous for 6 alleles, S_2–S_7). The results showed that in the first series, of 41 alleles (34 from the parent plants and 7 from the homozygous plants), 34 (83%) were different and that in the second series 25 (96%) of the 26 alleles were different.

807. HARTWIG, E. E. 633.366:575.11
Inheritance of growth habit, cotyledon colour, and cup-leaf in *Melilotus alba*.
J. Amer. Soc. Agron. 1942 : **34** : 160–66.

Genetic studies with *Melilotus alba* have shown that: (1) The growth habits of F.C. 13074 and of the dwarf-branching segregate of F.P.I. 89911 are inherited as simple recessives to the common growth type. (2) The gene determining the dwarf-branching character in F.C. 13074 is different from the gene determining a similar character in the Alpha type and also different from the gene determining the dwarf-branching type in R.P.I. 89911. These genes are designated as d_1 for Alpha, d_3 for F.C. 13074, and d_4 for F.P.I. 89911. (3) Yellow cotyledon colour is a simple dominant to green cotyledon, but the F_1 cotyledon colour usually resembles that of the maternal parent. Environment appears to play a part in determining the colour of the F_1 cotyledon. (4) Cup-leaf is determined by a single gene which is recessive to normal leaf. (5) Genes *i* (green cotyledon), *c* (cup-leaf), and d_3 (growth habit of F.C. 13074) are independently inherited. *Author's summary.*

808. JOHNSON, I. J. 633.366:581.143.26:575.11
Cross fertility relationships of "Golden Annual" sweet clover with common species of *Melilotus*.
J. Amer. Soc. Agron. 1942 : **34** : 259–62.

Data indicate that Golden Annual is an annual form of *M. suaveolens*. In F_1 the annual form is dominant over the biennial in the same species.

Information on the homology of the genes for annual growth habit in interspecific crosses will be reported later.

809. TROLL, H.-J. 633.367:581.46:575.061.5
Kornertragsqualität verbessernde, schnelltrocknende kahlhülsige, gelbe Lupinen. (**Quick-drying smooth podded yellow lupins which improve the quality of the seed yield**).
Züchter 1941 : **13** : 283–89.

In moist summers sweet lupin seed often goes mouldy or begins to germinate, with considerable loss in quality. In examinations of 28,342 F_2 individuals of a cross between alkaloid-free and non-splitting yellow lupins one plant with pods free from hairs was found. In the progeny from 37 seeds from the main inflorescence of this plant there again appeared two plants in which the pods at a very early age lost their hairs. The 29 seeds from the side inflorescences gave all plants but one with smooth pods. The difference is owing to the later flowering of the side inflorescences, which were in consequence mainly self-pollinated. The character is thus regarded as a simple recessive and is designated *nud*. Already 47 alkaloid-free plants with smooth pods have been obtained.

The pods of these plants after immersion in water were quite dry in about an hour's time, whereas ordinary hairy pods took about $2\frac{3}{4}$ hours to dry. After immersion the pods were allowed to stand for 15 seconds and the water remaining on the pods was then measured; in the smooth pods this was only 32·69% of that remaining on the hairy pods. The same proportion between the two types was observed again after 3 hours. The hairy pods took 5 hours to reach by evaporation the weight (i.e. humidity) reached by the smooth pods 15 seconds after immersion.

Pods of both types were moistened with water 5 times a day for 5 days; the hairy pods contained 37·63% of sprouted seeds as opposed to 1·48% in the smooth pods.

A further advantage of the smooth podded forms is that they can be harvested earlier in the morning while the hairy forms are too moist.

810. 633.367:581.6:633.85
HACKBARTH, F. 633.367:575
Züchtung und Anbau der weissen Lupine. **(Breeding and cultivation of white lupin).**
Mitt. Landw. 1941 : **56** : 774–76.

Selections of *Lupinus albus* with an oil content of 12–13 and even 14%, as compared with 9–10% in the unselected forms are now being multiplied. No further increase seems to be attainable by mere selection.

The white lupin has excelled the blue and yellow in yield of seed, so that though its protein content was lower than the yellow, its protein yield was equal or greater. Breeding for alkaloid freedom is therefore being continued. Early maturity is a deciding factor in the cultivation of this plant and early forms have been selected from populations obtained from Egypt and Asia Minor. Crosses have also been made with early maturing forms.

ROOTS AND TUBERS 633.4

811. KOVALENKO, G. M. 633.491:575.127.2:581.02
(Summer plantings of potatoes).
Soviet Plant Industry Record 1940 : No. 4 : 47–50.

On 28th June, 1939, plantings were made with tubers obtained from spring sowings of the previous year and from summer sowings of the previous year. The tubers from summer sowings gave a crop that was healthier and gave a higher yield in 13 domestic varieties out of 16 tested. Twenty-eight F_1 hybrids of *Solanum demissum* x *S. tuberosum* on the other hand gave lower yields after summer planting. Nine second generation hybrids of *S. tuberosum* x *S. demissum* gave higher yields from summer planting in 33% of cases and lower yields in 66%. A still higher proportion of cases showing improvement from summer planting was observed in the back-crosses with *S. demissum* and the highest of all in crosses with complex hybrids of the *Acaulia* group.

The differences were more marked when the tubers from the two different types of reproduction were sown in spring instead of summer.

812. *KAMERAZ, A. J. 633.491:576.16:575
(Wild species as initial material in potato breeding).
Soviet Plant Industry Record 1940 : No. 4 : 13–30.

A brief outline is given of the variation found in the wild species in respect of such characters as habit, pigmentation, length of stolons, number of tubers per plant, size of tubers, their form and colour, earliness, period of dormancy, time of flowering and length of day reaction. Data are then given on dry matter content, nitrogen content and starch content. The highest protein content was found in *S. semidemissum* with 4·56–6·82%; starch contents up to 26% were found in some of the wild species, some of which also have unusually large starch grains. Vitamin C has been found to be exceptionally high in *S. Antipoviczii* v. *Gandarae* f. *densipilosum*.

Resistance to *Phytophthora* is found only in Mexican species, with the exception of *S. Vavilovii*, which has not yet been infected in natural conditions. Wart resistance has been tested only in a few of the wild species and the results are often contradictory. Almost all the tuberiferous species suffer from degeneration when grown near Leningrad, though some suffer less than others. Several species are immune to Colorado beetle and a number are resistant to varying degrees of frost; in the *Acaulia* group there occur forms resistant to — 8° C.

Fertility is very much influenced by environment and many species which set seed in S. America are sterile near Leningrad.

The wild species thus possess a number of characters that would be valuable in breeding. The main obstacle to their utilization is interspecific sterility. The results of interspecific crossing up to date are outlined. The most promising are the results from back-crossing with *S. tuberosum* and a number of good seedlings have been obtained in this way; e.g. *Phytophthora* resistance combined with good yield and type in F_1 (*S. Antipoviczii* x Mirabilis x Jubel) x Hindenburg; frost resistance with good yield and type in Wohltmann x (*S. goniocalyx* x *S. Bukasovii*); yields of 1 kg. per plant from Centifolia x (Ella x *S. leptostigma*), with a starch content of 20–21%.

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* An abridged translation of this paper is on file at the Bureau.

The most valuable practical results have been attained in crosses with the *Demissa* group, especially *S. demissum* which in addition to frost and blight resistance is resistant also to Colorado bettle. The variety 8670, which combines frost and blight resistance, has already been produced from the *S. demissum* crosses and many other promising hybrids are undergoing tests.

Though *S. punae* is not blight-resistant, some of its hybrids with domestic varieties, e.g. Fürstenkrone, are resistant to blight and also to black-leg. Many back-crosses have therefore been made with *S. tuberosum* and other species. Some of these hybrids combine blight-resistance, frost resistance and high yield and are regarded as highly promising.

813. 633.491:581.162.5:581.02
PERLOVA, R. L. 633.491:576.356.5:581.02
(Behaviour of South American potatoes in the Pamirs).
Soviet Plant Industry Record 1940 : No. 4 : 33–46.

In western Pamir good fruits with viable seeds have been formed in many wild Mexican species that in the north of the Soviet Union are sterile, e.g. the pentaploid *Solanum semidemissum* and the triploid *S. Vallis Mexici*. The seedlings of the latter species were all hexaploid, with 70–73 somatic chromosomes and they proved fertile with diploid, tetraploid and hexaploid species, while retaining the valuable parental characters such as resistance to blight and degeneration. Hybrids obtained from the hexaploid with *S. tuberosum* are fully fertile both in selfing and on back-crossing with *S. tuberosum*. The drought-resistant species *S. Jamesii* was also fertile in western Pamir, though the seeds formed failed to germinate.

Other species that have proved fertile in western Pamir include *S. aracc-papa*, *S. Herrerae* and *S. catarthrum* from Peru, *S. Millanii* and *S. Macolae* from Argentina, *S. maglia* (a triploid species, giving diploid seedlings), *S. leptostigma* and *S. edinense* from Chile.

Among the primitive cultivated species seed has been obtained in western Pamir from the triploid species *S. cuencanum*, *S. mamilliferum* and *S. tenuifilamentum* and from the diploids *S. Rybinii*, *S. cañarense* and *S. ajanhuiri*; also from many varieties of *S. andigenum* and Chilean *S. tuberosum* which in more northerly localities are not fertile.

The yield of tubers was higher in western Pamir than in northern localities in all species, the differences being specially marked in the primitive cultivated species.

Conditions in eastern Pamir proved too severe for most species, though many of them proved more frost-resistant there than in northern latitudes.

814. *BUKASOV. 633.491:581.192
(Classification of potato species on dry matter content).
Soviet Plant Industry Record 1940 : No. 4 : 144–45.

The highest dry matter contents are found in the wild species with the smallest tubers and the smallest leaf development. Among the primitive cultivated species, *S. ajanhuiri*, which is closest to the wild type, has watery tubers, whilst the youngest cultivated species such as *S. boyacense*, *S. Kesselbrenneri* and *S. Rybinii*, have tubers with high dry matter.

The widest range in dry matter content occurs in *S. andigenum* (16–26%) and in *S. tuberosum* (up to 33%).

815. †PROKOSHEV, S. M. and 633.491:581.192:576.16
MATTISON, N. L. 633.491:581.6
(Biochemical characteristics of new species of potatoes).
Soviet Plant Industry Record 1940 : No. 4 : 61–74.

Exceptionally high dry matter contents have been found in some of the wild species, the groups *Commersoniana*, *Longipedicellata* and *Demissa* being the richest. Many of the hybrids of the wild species have exceeded the highest domestic varieties and sometimes also exceed the higher of the two parents.

Starch content is also very high in some of the wild species and in some of the primitive cultivated species, whereas in *S. andigenum* it is generally low.

The primitive species and many wild species form much less sugar during storage than do the domestic varieties and the proportion of monosaccharides tends to be less.

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* An abridged translation of this paper is on file at the Bureau.
† An extended summary of this paper is on file at the Bureau.

Protein content is higher in many of the wild and primitive species, and the ratio of protein to non-protein nitrogen varies from species to species. It is thought that there is a real possibility of breeding potatoes with high protein content if the right parents for ensuring the other desirable qualities are used.
Unusually high vitamin C content is found in *S. Antipoviczii* and *S. Gandarae.*

816. *Prokošev, S. M. and
Kameraz, A. Ja. 633.491:581.192:575.127.2
(Inheritance of chemical composition of tubers in interspecific potato crosses).
Soviet Plant Industry Record 1940 : No. 4 : 51–60.
Analyses were made on the 1935 crop of a large number of hybrids of wild potato species with *S. tuberosum.* Many of the wild and primitive cultivated species have tubers with exceptionally high dry matter contents and the F_1 hybrids of such species as *S. demissum, S. Antipoviczii,* etc., also have high dry matter contents; the same applies to many of the back-crosses.
Crude protein content is generally intermediate between the two parents and often approaches the lower of the two. The authors do not agree with the statement of Schwartz and Kuzmin that high protein content is dominant (cf. "Plant Breeding Abstracts", Vol. VII, Abst. 683). The hybrids are generally intermediate between the parents in starch content. Some of the hybrids from such species as *S. demissum* and *S. Molinae* give very high values. The first generation hybrids with wild forms are generally of very low quality but their back-crosses with *S. tuberosum* may in certain combinations have quite high starch contents.

817. Edmundson, W. C. 633.491:581.331.2
Comparison of Katahdin potato pollen produced in the field and in the greenhouse.
Amer. Potato J. 1942 : **19** : 12–15.
The quantity of pollen in the anthers of Katahdin potato plants was found to be higher under greenhouse conditions than in the field at two places. Differences in percentage of stainable pollen were also observed.

818. *Bukasov, S. M. 633.491:582(89)
(New wild potato species from Argentine and Uruguay).
Soviet Plant Industry Record 1940 : No. 4 : 3–12.
Descriptions are given, in Russian and Latin, of a number of new diploid species allied to the triploid *S. Commersonii,* and of the triploid *S. Millanii.*

819. 633.491–2.411.4–1.521.6:575.127.2
New blight-resistant potato varieties.
Int. Rev. Agric. 1941 : **32** : p. 201 M.
The varieties Erika, Frühnudel and Robusta were obtained by crossing cultivated with "W" varieties (derived from South American primitive forms imported and improved since 1912). They are resistant to the group A of biotypes (comprising the chief races of *Phytophthora* found in Central Europe) and their high yielding ability has been transmitted by genes new to European potatoes.

820. Pierce, W. D. 633.492:576.16
A few remarks on the possible origin of the sweet potato.
Bull. S. Calif. Acad. Sci. 1941 : **39** : 229–30.
Two points, one linguistic and the other entomological, are given to support the contention that the sweet potato is of African or south Asiatic origin.

FIBRES 633.5†

821. Beasley, J. O. and
Brown, M. S. 633.51:575.127.2:576.356
Asynaptic plants of *Gossypium* and their polyploids.
Genetics 1942 : **27** : p. 131. (Abst.).
In the F_2 of American upland (*G. hirsutum*) x Sea Island (*G. barbadense*) cotton, fertile and

* Extended summaries of these papers are on file at the Bureau.
† See also Abst. 840.

sterile plants were found in a ratio of about 15 fertiles : 1 sterile. At first metaphase the fertile plants formed 26 bivalents while different sterile plants averaged 6 to 9 bivalents per nucleus. Doubling the chromosome number in the sterile plants failed to restore normal chromosome pairing and fertility.

822. Yu, C.-P. 633.51:575.243.061.6
The genetical behavior of three virescent mutants in Asiatic cotton.
J. Amer. Soc. Agron. 1941 : **33** : 756–58.

Three virescent mutants, differing from one another and from the previously reported v_1 (see "Plant Breeding Abstracts", Vol. X, Abst. 290) occurred in 1935-37 and are described. Data are presented to show that v_1 and v_2 are inherited independently and are complementary factors, and that v_3 and v_4 are independent; v_4 is inherited independently of the genes for anthocyanin pigment, corolla colour and curly leaf.

823. Moore, J. H. 633.51:581.6:575.148
The influence of any internal genetic change in a standard variety of cotton upon fibre length.
J. Amer. Soc. Agron. 1941 : **33** : 679–83.

In order to measure the influence of any internal genetic change in a standard variety of cotton upon fibre length, mass-selfed and open-pollinated progenies of a Mexican strain of American upland cotton (*Gossypium hirsutum* L.) were planted for three successive years on a field where only Mexican strains were grown. No change was noted in the combed fibre length or in its variability after one, two or three years of either mass-selfing or open-pollinating. Nor was any change detected in plant type or seed. It is concluded that registered varieties or varieties eligible for registration do not "run out" as measured by length of fibre where contamination of seed is avoided.

824. Smith, A. L. 633.51–2.6–1.521.6
The reaction of cotton varieties to Fusarium wilt and root-knot nematode.
Phytopathology 1941 : **31** : 1099–1107.

Preliminary observations show that the more important cotton varieties of the southeastern United States vary widely in root-knot (*Heterodera marioni*) resistance. Resistance to root knot appears to be associated with wilt (*Fusarium*) resistance, but it is suggested that this is incidental, since some wilt-resistant varieties show no more root-knot resistance than wilt-susceptible and semi-resistant varieties.

825. Sizov, I. 633.52–1.524:575
(Initial material for flax breeding).
Soviet Plant Industry Record 1940 : No. 4 : 87–106.

Data are given on the range of variation existing among flax plants with regard to such characters as plant height, size of seed, fibre content, oil content, branching, number of capsules per plant and yield of seed. The longest stems are found in the forms from northern Russia, the largest seeds in those from the Mediterranean shores, the highest oil content in certain forms from India and Argentina, containing up to 44% per dry weight. The longest vernalization stage is found in the winter flaxes of Transcaucasia and Asia Minor.

The ancient local populations consist of forms of a definite type in different districts, each adapted in the course of centuries to the particular conditions of growth and utilization characteristic of its district. The local fibre forms of northern Russia, especially from around Pskov, are the best in the world and constitute a unique material for breeding purposes; most of the best existing fibre varieties have, in fact, been produced by selection from the Pskov populations. Those from the Ural region are characterized by drought resistance, those of the Vologda and Archangel districts by early maturity and those round Kirov by winter hardiness.

A study of the local populations has shown them to be heterogeneous in respect of height of stem, resistance to rust and *Fusarium*, though resistance to the latter is much rarer than to the former. Variation is observed also in proneness to seed shedding and in quality and yield of fibre.

In the central and more southerly flax regions of the U.S.S.R. the dual-purpose forms, intermediate between fibre and oil types, are prevalent. This group shows greater variation in

seed weight and oil content, the forms with the largest seeds being found in the southern Ukraine and adjacent districts, and also in north America. This group contains forms resistant to rust and some resistant to *Fusarium* and to drought. The local forms and those from North America and Argentina are regarded as the most promising for breeding.
The true oil type occurs only in the extreme south of the Soviet Union, in Transcaucasia and Central Asia; it contains the greatest variation in seed characters; the highest oil content is found in some of the forms from Tajikistan and Uzbekistan, where it reaches 43·5%. The large seeded type, grown only for its seed, is found on the Mediterranean shores and islands and is described as a separate group. The 1,000 seed weight varies from 9 to 12 grm. and the oil content from 38 to 42·5%. The group shows little variation in ecological features and is suitable for cultivation only in the humid subtropics, where it is thought to have great possibilities as a basis for breeding oil and dual-purpose types.
The last group described consists of the winter and semi-winter forms; these are grown in the zones bordering on Turkey and Iran. These forms are strongly branched at the base producing 5–7 productive stems. They have the longest vernalization stage of any (20–25 days) but behave as spring forms when grown in the north, owing to the low spring temperatures. Their seeds are similar in type to those of the common fibre forms. The origin of these many-stemmed forms is unknown but they give very promising results in hybridization experiments, many of the hybrids combining the branching habit with tall stems or with large seed.
The vernalization stage is shortest in the fibre group (4–5 days) but this group has a longer photo-stage than the others, being retarded in flowering 15 days by growing in a 14 hour day. The large-seeded group has a longer vernalization phase (7–10 days) and shorter photo-stage (retarded only 6 days by 14 hour day). The oil group has a vernalization stage of 10–18 days and is not retarded by a 14 hour day. In the winter flax the vernalization stage is 20–25 days and the photo-stage short. The phase from flowering to maturity is shortest in the fibre and semi-winter forms and longest in the large-seeded group. The most rapid development in the early growth phases is observed in the forms with large seeds and the slowest in the semi-winter flaxes.
White flowers are more common among the oil group than the other groups. Flower and anther colour are correlated with seed colour, and size of seed with size of capsule, flower and cotyledon, except in the wild species. Seed form is correlated with form of petals and of cotyledons.
All the many different forms of flax are the product of combined and artificial natural selection under the influence of the varying ecological conditions of different regions—e.g. the fibre forms in the northern zones of the eastern hemisphere, the forms with large seeds in the Mediterranean countries, etc., selection for ecological and industrial adaptation having gone on side by side.

826. Dillman, A. C. 633.52–2.111–1.521.6:575
Cold tolerance in flax.
J. Amer. Soc. Agron. **1941** : **33** : 787–99.
The behaviour of 12 varieties of linen and seed flax during the 3 winters 1938–41 at Arlington, Va., is reported. Branched varieties such as Roman Winter, Rio, Rigor and Bolley Golden were the most hardy and the fibre varieties and Redwing and Bison were susceptible. A selection of a single surviving plant in a row of Indian Type 12 gave a progeny possessed of remarkable hardiness. So too were the progenies of the crosses of Rio and Rigor x Roman Winter, a hardy variety, and the F_4 contained plants as hardy as the Roman Winter parent. No correlation was observed between hardiness and wilt resistance.

827. Hoffmann, W. 633.522:577.8:575
Gleichzeitig reifender Hanf. (**Simultaneously ripening hemp**).
Züchter **1941** : **13** : 277–83.
The various sex types occurring in hemp are described and some of them are illustrated. Two highly fertile monoecious plants of the female type were found in a population of Slovakian hemp. The seed from these two plants was grown in the greenhouse and brother-sister matings were made with the resulting plants. The F_2 generation contained monoecious plants and feminized male plants, which were further subjected to selfing, brother-sister mating and crossing with other hemps. By removing the normal male plants that segregated out in all the progenies it was possible to reduce these from 36–37% in 1937 to only 4–5% in 1941; in

certain progenies male plants were absent altogether. The population is now being multiplied on a large scale and will be tested under farming conditions. It consists of 70–76% female plants, 6–8% monoecious plants of the female type, 7–12% feminized males and 4–6% normal males. All but the last class ripen at the same time, thus obviating the disadvantages of having a large proportion of the earlier ripening normal males which spoil the quality of the product. Preliminary yield tests indicate that the new type is not inferior in yield of fibre; its seed yield is higher than that of normal hemp.
The population shows great variation from plant to plant in fibre content, which offers a field for further selection; forms of the male type tend to have a higher fibre content but lower seed yield.

828. PERSIJANINOVA, A. 633.522:577.8:581.01
(Change in proportion of male and female plants in hemp sown from old seeds).
Soviet Plant Industry Record 1940 : No. 4 : 146–48.
Old seed gathered in 1925–32 was sown in 1939 and gave a very low and tardy germination. The seedlings were very under-developed and the mature plants arising from them proved to be almost exclusively females, with only a small proportion of male plants. A few families gave vigorous seedlings and these contained the normal proportion of male and female plants.

829. NASSONOV, V. A. 633.522–1.524:581.4
(Anatomical characteristics of the geographical races of hemp).
Soviet Plant Industry Record 1940 : No. 4 : 107–20.
Detailed descriptions and illustrations are given of the anatomy of the hemp stem. A study was made of 20 races of different geographical origin. There are three main types, the Japanese type with 6 leaf traces, the Italian type with 8 and the type with multiple leaf traces in the upper part of the stem. The southern hemps are in general herbaceous and the northern hemps woody, Japanese hemp representing the extreme limit of the southern group and that of the Komi autonomous republic the extreme of the northern.
Descriptions are given of certain wild forms too, some of which have a higher fibre content than some cultivated forms. The same differences are seen between northern and southern wild forms.

SUGAR PLANTS 633.6*

830. CROSS, W. E. 633.61:575(82)
Las cañas "Tucumanas" de semillero. Resultados obtenidos en los últimos años. **(The "Tucumán" seedling canes. Results obtained in recent years).**
Rev. Industr. Agric. Tucumán 1941 : 31 : 119–68.
The results for the period 1935–40 are presented, with tabular data regarding yield of cane, percentage brix, sucrose, glucose, purity and total yield of sugar. Descriptions are given of all the most promising canes and of their performance.
Among the more promising canes are (1) Tuc. 2622, an uncontrolled seedling from P.O.J. 2878, a very vigorous, thick cane, resistant to drought and frost, tolerant of mosaic, much superior to P.O.J. 36 in yield of both cane and sugar; (2) Tuc. 2645, another uncontrolled seedling of P.O.J. 2878, very tall and vigorous, resistant to drought and free from mosaic, and surpassing P.O.J. 36 very considerably in yield of both cane and sugar; and (3) Tuc. 2680, also a seedling of P.O.J. 2878 and a cane of exceptional vigour and productive tillering capacity, resistant to drought and mosaic and extremely frost resistant; it has outyielded P.O.J. 36 and all other seedlings in both cane and sugar.
Some of the newer seedlings are also highly promising, such for instance as Tuc. 3381, from P.O.J. 2878 x a seedling of P.O.J. 234, which combined the high yield of the former parent with the high sugar content of the latter and has yielded almost twice as much sugar per row as P.O.J. 36; it is also resistant to frost and drought, tl ough not to mosaic. Other seedlings from this same cross are promising, and some are mosaic resistant. Exceedingly promising seedlings have appeared also in the crosses H. 31·626 x H. 32·8535.
An index of all the Tucumán seedlings, with indications of their origin, terminates the article.

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* See also Abst. 742.

831. MUNERATI, O. 633.63:581.165:578.08
Beobachtungen über die Teilung von Beta-Rüben. (**Observations on division of beet roots**).
Züchter 1941 : **13** : p. 290.
Valuable breeding material is multiplied by dividing the roots about two months after they are planted out. An individual that has been divided 36 times is illustrated. Only one bud mutant has been observed among 10,000 cases and the risk of genetical variation is regarded as negligible.

832. CULBERTSON, J. O. 633.63:581.6:575.11
Inheritance of factors influencing sucrose percentage in *Beta vulgaris*.
J. Agric. Res. 1942 : **64** : 153–72.
The data presented indicate that relatively homozygous lines of desirable sucrose percentage may be obtained comparatively easily. Apparently the production and storage of sucrose are influenced primarily by physiological processes, which processes are controlled genetically. The ability to store sucrose is inherited in a quantitative manner and is dependent on the inter-action of several genetic factors.
A highly significant correlation was obtained between the sucrose percentage of mother beets selected from segregating populations and the means of their inbred progenies.

STARCH PLANTS 633.68

833. SPRINGENSGUTH, W. 633.682:581.6(81)
Die Kultur des Manioks, seine Krankheiten und Schädlinge im Litoral des Staates Sta. Catharina (Brasilien). (**The cultivation of cassava, and its diseases and pests in the Sta. Catharina litoral of Brazil**).
Tropenpflanzer 1940 : **43** : 286–306.
Manihot utilissima Pohl. ranks with maize as the chief crop of the district.
The varieties grown are almost without exception the sweet varieties whose roots contain the least amount of hydrocyanic acid. Latterly, a few varieties of the bitter manioc have been grown exclusively for the production of starch.
The varieties, which are known mostly by German names, differ in shape and colour of the leaves, petioles and leaflets, whether the stem has or has not leaves, the extent to which it is branched as well as in differences concerning the tuber stalks and the skin and flesh colour of the tubers. There are also, of course, great differences in taste, cooking quality and starch content. Only one variety has been established that yields a product suitable for human consumption and for fodder. The yield is, however, much lower than that of the other varieties.
As manioc is grown on the same soil year after year it provides a happy hunting ground for fungus and insect diseases. Of the fungus diseases, *Cercospora cassavae* Ell. et Ev. attacks the sweet manioc but the bitter manioc is resistant. R.M.I.

STIMULANTS 633.7

834. PIESCU, A. and
NEAGU, N. 633.71:575.127.2
Hibrizi *Nicotiana Tabacum* x *N. sylvestris*. (**Hybrids of *N. Tabacum* x *N. silvestris***).
Bul. Cultiv. Ferment. Tutun. 1940 : **29** : 259–78.
Hybrids have been obtained between *N. silvestris* and three varieties of *N. Tabacum*, Ialomița, Ghimpați, and Calicanthema. About 50 plants of each F_1 were grown in 1940. The parent forms and the hybrids are described in some detail. The hybrid Ialomița x *N. silvestris* is taller and thicker than either of the parents, its leaves are larger and mature earlier; it differs from the parents in producing a number of branches bearing subsidiary inflorescences. In form the inflorescences are intermediate between the two parents, as are also the flowers in colour, length of corolla tube, and a number of other characters, though the petals are larger than those of either parent.
The hybrid is sterile and no set has been obtained by pollinating it with the parent forms. All the F_1 plants obtained were identical, with the exception of one which was half the size and unbranched.

The hybrid Ghimpaţi x *N. silvestris* is also larger than either of the parents and bears a number of secondary inflorescences; the leaves are larger than those of the parents and mature earlier. The inflorescence and flowers are intermediate, except in respect of diameter and coloration of the corolla, in which they exceed both parents. This hybrid is also sterile and forms no seed when pollinated with the parent forms. All F_1 plants are identical.
The hybrid Calicanthema x *N. silvestris* is much more vigorous and much larger than the parents and much more branched, the branches again bearing secondary inflorescences. The leaves are larger than in the parents, the flowers are more numerous and are all single, as opposed to the double flowers of Calicanthema; the corolla is larger, but in other characters the flowers are intermediate. The hybrids are all sterile and all identical, except for one with shorter inflorescences and white flowers as opposed to pink.
Thus all the hybrids are taller than the parents, the tallest being the Ghimpaţi hybrid. A comparison of the parents and hybrids shows that the gain in height is in inverse proportion to the mean height of the parents, from which it is concluded that the factor which determines the increase comes chiefly from *N. silvestris*.

835. ALLARD, H. A. 633.71:581.45
Some aspects of the phyllotaxy of tobacco.
J. Agric. Res. 1942 : **64** : 49–55.

Most American varieties of *Nicotiana Tabacum* have 3/8 and 5/13 phyllotaxy. The phyllotaxy tends to change to a lower order towards the top of the stem and may also vary between individuals. The direction of the spiral varies between individuals but never on the same individual. *N. glauca* and *N. rustica* have 3/8 phyllotaxy while *N. gossei* and small leaved Turkish varieties of *N. Tabacum* more frequently have 2/5.

836. RĂDULESCU, M. 633.71:581.48
Studiul morfologic şi biometric al seminţelor de "*Nicotiana Tabacum*" var. Virginia Bright. (**Morphological and biometric study of the seeds of *N. Tabacum* var. Virginia Bright**).
Bul. Cultiv. Ferment. Tutun. 1941 : **30** : 107–12.

Data are given regarding the seed form and colour, cell size of the seed coat and size and form of the hilum, 1,000 seed weight and its variation coefficient, volume and density of seeds. Frequency distributions are given for length and breadth of seed, both of which are unimodal, showing that the variety is homogeneous. Germination was tested under various conditions of light and temperature.

837. CLAYTON, E. E. and McKINNEY, H. H. 633.71–2.8–1.521.6:575
Resistance to the common mosaic disease of tobacco.
Phytopathology 1941 : **31** : 1140–42.

Two types of resistance to common mosaic disease are known in tobacco—the Ambalema type (see "Plant Breeding Abstracts", Vol. VIII, Abst. 1281; and Vol VI. Abst. 609) and the glutinosa type (see "Plant Breeding Abstracts", Vol. IX, Abst. 386). The glutinosa type has been described by some authors as a local necrotic lesion reaction but field tests show that the typical reaction is systemic necrosis. It seems therefore that the glutinosa type of mosaic resistance has no practical value.

838. TEIXEIRA MENDES, J. E. 633.73:575
Seleção do cafeeiro. Literatura estrangeira. (**Coffee selection. Foreign literature**).
Rev. Inst. Café S. Paulo 1941 : **16** : 740–44.

A brief review is given of work published in Java and in India, which has already been included in "Plant Breeding Abstracts".

839. CARVALHO, A. 633.73:575(81)
Sementes selecionadas de café. (**Selected seeds of coffee**).
Rev. Inst. Café, S. Paulo 1941 : **16** : 1418–26.

Different zones of the State of São Paulo tend to be planted with different coffee varieties according to their age—the local *typica* variety in the oldest plantations, Bourbon in the next oldest and Sumatra in the more recent, the variety Maragogipe A.D. (a high yielding variant of Maragogipe) in the vicinity of Mocóca where it was discovered and planted under names "Café Híbrido" or "Híbrido Rosa Blanca", etc., etc.

In 1932 the Coffee Institute began marking individuals typical of each variety in the zones where they were first introduced. The typical plants were left standing singly and their fruits were collected in the first three years. Grafts were also made from each tree and flowered and fruited the following year. The selected plants were subjected to self-pollination.
At Campinas the seeds from self-pollination were sown at a spacing of 20 × 5 cm., forming "Nursery A". From this nursery the best plants were selected and planted out at a wider spacing forming "Nursery B" and the best plants from Nursery B were planted out in the selection plot. Twenty plants of each progeny were planted in the selection plot, each plant being harvested separately. Some 13,000 trees are now under examination. Lot No. 1 was planted in 1935 and started to bear in 1937. Differences are evident in regard to yield; resistance to drought and to die-back also differed, not only in different progenies but in different plants within the progenies. So far the best yields have been given by the variety *laurina*, the seeds of which are known in commerce as "café murta". Some of the Bourbon progenies are distinguished by very regular bearing.
The same progenies are tested also at Pindorama and Ribeirão Preto, in zones with very different climatic conditions, where many progenies have given quite different results.
Crosses have also been made between the different selected trees, including combinations such as Bourbon x Maragogipe, Bourbon x *typica*, Maragogipe x mokka, *laurina* x Maragogipe, etc. The seeds were dealt with in the same way as the selfed seeds. Some of the hybrids have yielded much better than the selfed progenies, those of Bourbon x Maragogipe having done particularly well.
Many of the hybrids have been self-pollinated and have given a number of valuable combinations among their progenies. One of these is the hybrid Maragogipe-*laurina*, which is a well-developed drought-resistant form. A number of new types have also been found in the progeny of the hybrid Maragogipe x mokka (a variety with very small, flat beans).
The most promising hybrids are multiplied by grafting.
Observations are being made on *C. semperflorens*, from which ripe fruits can be gathered at almost all times of the year.
Special preference in selection is given to the plants which bear regularly every year, as opposed to those with a biennial cycle. Only 15 such plants were found in the variety Bourbon among 1,107 plants examined. They have been selfed and their progenies are now under observation.

OIL PLANTS 633.85

840. 633.85–1.524(4)
633.5–1.524(4)
REGEL, C. 633.913–1.524(4)
Beiträge zur Kenntnis von mitteleuropäischen Nutzpflanzen. (**Contributions to the knowledge of Central European plants of economic value**).
Angew. Bot. 1941 : **23** : 137–51.

The author passes in review a number of plants with oil bearing seeds, many of which can be cultivated with success in northern Europe and can be recommended as objects of breeding. On the basis of data appearing mainly in Russian literature he discusses various species of *Rosa* and *Cucurbita* and forms of soya bean.
New fibre plant species are discussed on similar lines, and lastly various new rubber plants.

841. KADEN, O. F. 633.853.34–1.524(81)
Die Ölpalmbestände Bahias und ihre Nutzungsmöglichkeiten. (**The oil palms of Bahia and the possibilities of utilizing them**).
Tropenpflanzer 1940 : **43** : 177–83.

It has already been established that the oil palm, *Elaeis guineensis* was introduced into Brazil by the slaves brought from Africa. At present the little oil produced is used mainly locally. The types of oil palm found in Bahia are classified as follows:—(1) Var. *comunis*, form "Dipobe" (Annet); var. *macrocarya* = Congo type (Rutgers and Yampolsky). (2) Var. *comunis*, form "Liscombe" (Annet); var. *dura* = Delitype (Rutgers and Yampolsky). (3) Var. *comunis*, form "Liscombe" (Annet); var. *tenera* = Liscombe type (Rutgers and Yampolsky). (4) Var. *virescens* (A. Chevalier). (5) Var. *pisifera* (Annet, Rutgers and Yampolsky).
The methods of oil extraction and the economics of production are briefly described. R. M. I.

842. LANGHAM, D. G. 633.853.74:576.356.5:581.04
Fertile tetraploids of sesame, *Sesamum indicum* Loew, induced by colchicine.
Science 1942 : **95** : p. 204.

The species, cultivated in all tropical and subtropical countries, is known only in its diploid form with 26 chromosomes. After treating axillary buds with specified preparations, chromosome counts in the pollen mother cells of new branches which developed larger mucilage-producing glands revealed the tetraploid number 52, while others had between 26 and 52. Tabulations are given of the reactions between chromosome number and certain morphological features.

Field tests are in progress on seed yields, percentage oil content, etc., of types with varying chromosome numbers obtained in subsequent experiments by colchicine treatment, hybridization and selection.

843. SCHILLING. 633.854.54:575.12:633.52(43)
Die Ölleinzüchtung in Deutschland. (**Linseed breeding in Germany**).
Mitt. Landw. 1941 : **56** : 859–60.

Owing to a shortage of both linseed oil and flax fibre oil types have been crossed with fibre types; by further crossing the hybrids with fibre flax, forms have been produced which are 80–110 cm. in height, much branched but only at the top, and have a high oil content.

Attempts to raise the thousand seed weight to over 15 grm. by crossing oil types together have not been successful.

844. EL-KILANY, M. A. 633.854.54:575.24:575.061.6
Flax in Egypt. Part III. Flower and anther colour inheritance.
Bull. Minist. Agric. Egypt 1939 : No. 205 : 5–7.

A mutation (later named Gîza Oil flax) was found in a field of Normandy flax. The mutation had a flower diameter four times that of Normandy and seeds over twice as heavy as Normandy. Both Gîza Oil and Normandy have blue flowers and blue anthers. Two mutations have been found in Gîza Oil—one has blue flowers and yellow anthers while the other has white flowers and yellow anthers. An F_2 segregation of 3 blue anthers : 1 yellow anther was obtained from the cross blue flower blue anthers x blue flower yellow anthers. In the F_2 generation from the cross blue flower blue anthers x white flower yellow anthers the segregation appeared to be 9 blue flower blue anthers : 3 blue flower yellow anthers : 4 white flower yellow anthers. There were no white flower blue anthers plants. The factor for white flowers thus also inhibits the development of the blue anther colour.

MEDICINAL PLANTS 633.88

845. POPENOE, W. 633.885.1(8+72)
Quinine from the "fever-tree".
Agriculture in the Americas 1942 : **2** : 43–47.

This article contains some historical notes on the cinchona tree and observations on its nomenclature and the uses of different botanical species with indications of the requirements for cinchona cultivation in America.

RUBBER PLANTS 633.91*

846. NICHIPOROVICH, A. A.,
OSTAPENKO, L. A. and
VASSILJEVA, N. G. 633.913:576.356.5:581.6
(**Anatomical peculiarities of diploid and polyploid forms of rubber-yielding plant *Taraxacum kok-saghyz* Rodin**).
Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1941 : No. 2 : 309–31.

Kok-saghyz contains 6—10% and even 12–13% of rubber on a dry weight basis, as compared with 1% in *Hevea brasiliensis*. It is a shy grower however and often difficult to establish. The authors review and discuss the literature on the differences between diploid and polyploid plants.

Tetraploid forms of kok-saghyz had larger inflorescences and seeds, higher germinating capacity, thicker and heavier leaves, with a higher water content. No difference was detected

* See also Abst. 840.

in the size of the intercellular spaces. The polyploids showed a greater photosynthetic activity and lower respiration in the early growth phases and the converse in the later phases. The tetraploid proved more adapted to shady conditions than the diploid. At 20–25° C the catalase activity of the polyploids was lower than that of the diploids but at 14–15° C no such difference was found in the first 4–7 minutes but after that the polyploids were again lower than the diploids. The catalase in the polyploids thus seems to be less resistant to the effects of increased temperature.

The number of rings of latex vessels and of parenchyma cells between them was the same in diploids and tetraploids. The tetraploid roots were thicker and had a thicker cortex, owing not to a difference in rate of cell division but a difference in cell size; the parenchyma cells were larger in the tetraploid, as were also the latex vessels, though these differed to a lesser degree. Consequently the polyploids, though their total yield of rubber is greater, have a somewhat lower percentage rubber content.

Some of the polyploid plants examined show promise of being very promising material for breeding.

847. REGEL, C. 633.917–1.524(4)
Beiträge zur Kenntnis von mitteleuropäischen Nutzpflanzen. (**Contributions to the knowledge of Central European plants of economic value**).
Angew. Bot. 1941 : **23** : 117–23.

Special consideration is given to *Euonymus verrucosus* and *E. europaeus*, both of which produce gutta-percha in their roots. It is thought probable that the gutta-percha content could be materially increased by breeding.

FRUITS 634

848. 634.1:581.162.3
PASSECKER, F. 634.2:581.162.3
Untersuchungen über die Befruchtungsverhältnisse von Kern- und Steinobstsorten. (**Pollination trials with pome and stone fruits**).
Gartenbauwiss. 1941 : **15** : 532–58.

Details are given of the technique used in tests of pollen germination and the results of the tests on a large number of apple and 13 apricot varieties are tabulated. The technique of pollination is described and the results of a number of pollinations on apples are given. These are discussed with reference to the findings of other workers as are also the results for pears, apricots and cherries. It is noted that there are some varieties of apple that in spite of a high rate of pollen germination, are incompatible with certain other apple varieties. Wintergoldparmäne has pollen which germinates well but it has already been shown to be incompatible with Kanadarenette, Goldrenette von Blenheim and in the present experiments with Geflammter Kardinal.

Among pears, Williams Christbirne is shown to be an unsuitable pollinator for Pastorenbirne, Diels Butterbirne and Herzogin von Angoulême (Duchesse d'Angoulême).

No certain evidence of metaxenia could be found. There was, however, a relation between taste and number of seeds. The fruits with few or no seeds had not such a good flavour as those with many seeds. This was more marked in pears than in apples. R. M. I.

849. KEMMER, E. and
SCHULZ, F. 634.1:581.165.711
Versuche mit *Pirus baccata*-Unterlagen. (**Experiments with *P. baccata* stocks**).
Gartenbauwiss. 1941 : **15** : 526–31.

Four varieties of *P. baccata*, namely *sibirica, mandschurica, himalaica* and *Jackii* were tested. All four varieties produced abundant seed, even the smallest yield from *Jackii* was considerably higher than in the cultivated varieties. According to Rybin, *P. baccata* is diploid, however, the percentage germination was low and more closely resembled that of triploids.

The varieties used for grafting were, Schöner v. Boskoop, Gold Parmäne, Ontario, Joseph Musch and Kaiser Wilhelm. The results were unsatisfactory. In most cases the fusion of stock and scion left much to be desired. Only 44% of the stocks could be carried over into the second year. R. M. I.

850. Wyman, D. 634.12:575.127.2
A few hybrid crabapples.
Nat. Hort. Mag. 1941 : **20** : 52–54.

The following hybrid crab apples are described:—*Malus atrosanguinea* (*M. Halliana* x *M. Sieboldi*), *M. micromalus*, *M. purpurea* (*M. pumila Niedzwetzkyana* x *M. atrosanguinea*), the Aldenham crab apple (*M. purpurea Aldenhamensis*), the Eley crab apple (origin doubtful), the Lemoine crab apple and *M. robusta* (*M. baccata* x *M. prunifolia*).

851. Schmidt, M. 634.22:575.127.2
Untersuchungen über den züchterischen Wert von Sämlingen der Kirschpflaume, *Prunus cerasifera* Ehrh. (**Investigations on the breeding value of seedlings of the cherry plum, *P. cerasifera* Ehrh**).
Gartenbauwiss. 1940 : **15** : 247–311.

Thirty-six seedlings of *P. cerasifera* which originated from seeds brought back from Turkey by Professor Bauer were studied with a view to their value as breeding material. In their early stages the seedlings were briefly described by Rudloff (see "Plant Breeding Abstracts", Vol. V, Abst. 474).

The seeds which came from various parts of Turkey and Anatolia, were sown in 1927 and the present observations were made during 1939 and 1940. The plants showed very marked diversity.

The morphological characters studied and described are habit, leaves, flowers, fruit including shape and size, pedicel, colour of the skin and flesh, bloom, thickness and firmness of the skin and shape of the stone. Taste and economic value of the fruit and yield are noted, and phenological observations on flowering time, duration and time of ripening are made. Details are given of the pollination behaviour and crossing possibilities with other species, as well as descriptions of selfed seedlings and hybrids. Only three seedlings were obtained from crosses with *P. domestica*.

The most marked feature from the breeder's point of view is the fertility of these seedlings. They also thrive without special attention and are frost-resistant. The size of the trees makes harvesting easy and the capacity for regeneration is a valuable character. The seedlings are also resistant to the plum sawfly and apart from occasional attacks of *Monilia*, they are resistant to other diseases.

It is suggested that by crossing between the varieties certain improvements might be made as the fruit has already a market, especially for jam making.

To incorporate some of the desirable characters with those of *P. domestica* presents difficulties on account of the differences in chromosome number. In *P. cerasifera*, $n = 8$ and in *P. domestica*, $n = 24$. It is thought possible that the so-called "domesticoid" seedlings here described may have a chromosome number $2n = 24$ and treatment with colchicine is being tried to induce polyploidy and facilitate crossing with *P. domestica*. R. M. I.

852. Krjukov, F. A. 634.22–2.111–1.521.6:575.127.2
(Influence of the 1939 40 winter on the collection of plum species and varieties at the Krasnyi Pakhar' Experiment Station).
Soviet Plant Industry Record 1940 : No. 4 : 75–78.

The exceptionally severe winter of 1939–40 killed a great number of cultivated and even wild fruit trees. Among the *Prunus* species, *P. spinosa* L. was quite undamaged. Selections of *P. nigra* and *P. ussuriensis* almost all survived. Among the partially hardy species were *P. americana* and *P. triflora* Roxb. var. *Koreana* Kom. Indications are given of the behaviour of a number of Michurin's hybrids and of various interspecific hybrids produced by Hansen and others in the U.S.A. The best varieties for planting are enumerated.

CITRUS FRUITS 634.3

853. Swingle, W. T. 634.3:582
Three new varieties and two new combinations in *Citrus* and related genera of the orange subfamily.
J. Wash. Acad. Sci. 1942 : **32** : 24–26.

In preparing an extended treatment of the taxonomy of the aurantioid plants, which will be published shortly, the author has found it necessary to describe a few new genera, species and varieties as well as to make a number of new combinations. In the present paper there are

described *Citrus macroptera* var. *Kerrii* Swingle, n. var. (an orange from west-central Thailand), *Citrus reticulata* var. *austera* Swingle, n. var. (this variety is widely grown about Swatow, China, and is used as a rootstock upon which to graft other varieties; it is grown from seeds), *Murraya alata* var. *hainensis* Swingle, var. nov., *Clausena heptaphylla* var. *Engleri* (Tan.) Swingle, n. comb. and *Murraya microphylla* (Merr. and Chun) Swingle, n. comb.

VARIOUS SMALL FRUITS 634.4

854. Zimmerman, G. A. 634.418:575.127.2
Further report on the papaw.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : 133–36.
The report supplements that given to the Boston Convention in 1938 regarding *Asimina triloba*. Since that date a hybrid of *A. triloba* x *A. angustifolia* designated *A. trigustifolia* has been produced. It is anticipated that fruit of this hybrid will be satisfactory.

855. Snell. 634.451
"Kaki", eine neue Obstart in Italien. (**Kaki, a new fruit species in Italy**).
Angew. Bot. 1941 : **23** : 124–25.
Diospyros Kaki flourishes in South Italy and is attacked by neither fungous diseases nor pests, and withstands frosts of up to — 10° C. The fruits contain up to 60% invert sugar (on dry weight) and are also high in vitamin content.

NUTS 634.5

856. Gellatly, J. U. 634.5:575.12
Varieties and plantings of nut trees in British Columbia.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : 74–80.
A popular account is given of hybridizations in various nut trees.

857. Miller, G. A. 634.51:575.12
Tree breeding.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : 99–103.
A discussion of the subject by one whose work is concerned with the production of artificial hybrids of *Juglans* for large-scale forestry plantings.

858. Crath, P. C. 634.51:575.127.2
Cross-pollination the cause of hardiness, earliness and sweetness in Carpathian Persian walnuts.
Rep. Proc. 30th Annu. Mtg Nth Nut Gr. Ass. 1939 : 85–89.
Over 1,000 distinct varieties of *Juglans maxima* are found in the Carpathian mountains. The author has made a large collection of these varieties and finds some of them to be hybrids. One form, No. 46, appears to be a hybrid with *J. regia* and has proved resistant to frost and to the light green leaf hopper and bears nuts of excellent quality with thin shells. Others appeared to be hybrids of *J. regia* with *J. Duclouziana, J. Kamaonia* and others.

859. Vilkomerson, H. 634.531:581.162
Flowering habits of the chestnut.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : 114–16.
A discussion of the importance of flower behaviour in *Castanea* for breeding and selection work.

860. Snyder, D. C. 634.531–2.111–1.521.6
The chestnut in Iowa.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : p. 129.
There is wide variation in winter-hardiness of *Castanea mollissima* and selective breeding is required to develop varieties suitable for the cold winters of Iowa.

861. Stoke, H. F. 634.531–2.421.9–1.521.6:575.127.2
Chestnuts in Eastern United States.
Rep. Proc. 31st Annu. Mtg Nth Nut Gr. Ass. 1940 : 119–23.
The author doubts whether the blight resistance of the chinquapin (*Castanea pumila*) is such as to merit its use in hybridization. The Chinese chestnut, *C. mollissima*, has given rise to certain selections which excel the American chestnut (*C. dentata*) in quality and are blight-resistant, e.g. Carr and Reliable. Several hybrids of the Chinese species are also promising.

862. BURRET, M. 634.61:575.127.2
Um caso de hibridação entre *Arecastrum Romanzoffianum* e *Butia capitata*.
(A case of hybridization between *A. Romanzoffianum* and *B. capitata*).
Rodriguesia Rio de J. 1940 : **4** : p. 277.

The plant in question is assumed on morphological grounds to be a hybrid between the two genera, both of which were originally classified as species of *Cocos*.

863. 634.63:581.162
ALMEIDA, F. J. de 634.63:576.312
Safra e contra-safra na oliveira. **(Cropping and crop failure in the olive).**
Min. Agric. Lisboa 1940 : Invest. Sér. No. 7 : Pp. 154.

In discussing the causes of crop failure in the olive a full account is given of the floral biology and process of fertilization in the local variety Galega; this includes a description of meiosis in the pollen mother cells, where the chromosome number $n = 24$ was observed. At anaphase I and II two lagging chromosomes were frequently encountered, in addition to which the microspores were often of unequal size and the pollen low in germinating capacity; this leads the author to suggest that the olive is a polyploid species. Pollen germination tests in 0·8% agar and 10% sucrose at 25° C (found to be the optimum medium) gave very low germination percentages; the small pollen grains, of which a great number are formed, almost entirely failed to germinate.

The development of normal and of aborted ovules is described. Varietal differences of a month or more were observed in the time at which the various stages were reached, the variety Lentisqueira being the latest of all the varieties examined.

Owing to the excessive number of flowers produced by the tree the low fertility does not always affect the yield of fruit, which is often produced in greater numbers than the tree can support. Crop failures are more often due to a variety of other causes, such as exhaustion of the tree by excessive cropping in the previous year or by autumn flowering; abscission of flowers or fruits, processes which are described in detail; and "Millerandage", a phenomenon that seems to be largely influenced by environment. The various factors that seem to affect crop failure are discussed. In the varieties grown in Portugal no sign of self-incompatibility has been observed.

Various cultural measures which tend to reduce the risk of crop failure in alternate years and which thus contribute towards a regular cropping are enumerated.

SMALL BUSH FRUITS 634.7

864. DARROW, G. M. and
CLARK, J. H. 634.73:575
The Atlantic, Pemberton, and Burlington blueberries.
Circ. U.S. Dep. Agric. 1940 : No. 589 : Pp. 8.

Descriptions are given of three new varieties of blueberries—the Atlantic, Pemberton and Burlington—which are being introduced. The origin of the varieties is also given.

865. DARROW, G. M. and
MORROW, E. B. 634.75:575.12
The Massey strawberry.
Bull. N. Carolina Exp. Sta. 1940 : No. 327 : Pp. 3.

A description is given of the Massey strawberry (N.C. No. 613) which is being introduced for eastern North Carolina. It originated from the cross U.S.D.A. No. 634 x Blakemore.

OTHER FRUITS 634.77

866. ZIRKLE, C. 634.771:575.127.5
The origin of the banana.
Morris Arbor. Bull. Univ. Pa 1941 : **3** : 69–71.

A brief note on some ancient beliefs about the banana and its origin from a *Colocasia* x date cross.

867. Graves, A. H. 634.972.4–2.421.9–1.521.6:575.127.2
Breeding work toward the development of a timber type of blight-resistant chestnut: Report for 1940.
Bull. Torrey Bot. Cl. 1941 : **68** : 667–74.

Owing to unfavourable weather conditions many of the results of crossing were less successful than in normal years. Pollen from trees selected by Luther Burbank was used for crossing with the most resistant Japanese chestnut and others. Other combinations reported as new to science are [*C. crenata* x (C x D)] x [(*C. mollissima* x *C. Seguinii*) x *C. crenata*], (C x D) x *C. floridana*, (C x D) x [(C x D) x *C. dentata*], (C x D) x [(C x D) x (C x D)], (*C. dentata* x *C. mollissima*) x (C x D), (*C. dentata* x S8) x *C. mollissima*, (*C. dentata* x S8) x (*C. crenata* x S8), (*C. dentata* x S8) x [(C x D) x *C. dentata*], S8 x *C. neglecta*, (S8 x *C. crenata*) x C. *neglecta*, and (S8 x *C. dentata*) x (*C. mollissima* x *C. Seguinii*)—where C x D = *C. crenata* x *C. dentata*. The results of these and other crosses are discussed.

Co-operative plantations of hybrids on land of responsible persons interested in bringing back the chestnut to North America have been extended.

Many of the *C. dentata* trees that were killed by blight have formed new shoots from the base, some of which ultimately bear fruit. It is thought that bud variation may have produced changes in blight resistance in some of these branches and as many of their progeny as possible are being studied for resistance.

868. Hall, R. C. 634.973–2.7–1.521.6
Control of the locust borer.
Circ. U.S. Dep. Agric. 1942 : No. 626 : Pp. 20.

Areas have been observed in which certain varieties of *Robinia pseudoacacia* appear to be highly resistant to *Cyllene robiniae*. Two outstanding examples of this resistance occur in shipmast locust in southern Indiana. These two varieties are being tested in field plantings in the Central States.

869. Schramm, J. R. 634.975:575.22
An interesting variant of white spruce.
Morris Arbor. Bull. Univ. Pa 1941 : **3** : 67–69.

Nothing is known of the genetic constitution of the variant which, it is thought, would be unlikely to breed true from seed. Its chief peculiarity is its very dense compact outer surface which gives the tree a box-like appearance—hence the name proposed for the new form, *Picea glauca* (Moench.) Voss. forma *buxoides* f.n.

870. Gopal-Ayengar, A. R. 634.975:576.354.4:576.312.34
Structure and behaviour of meiotic chromosomes in gymnosperms.
Genetics 1942 : **27** : p. **143**. (Abst.).

The meiotic chromosomes of *Pinus*, *Taxus* and *Ginkgo* were studied.

VEGETABLES 635

871. Auchter, E. C. 635:575(73)
A background for victory. Research in nutritional values of vegetables provides a basis for avoiding mistakes of "war garden" campaign of 1917–18.
Seed World 1942 : **51** : No. 2 : 34–35.

Mention is made of the breeding of vegetables with disease resistance, frost resistance and higher vitamin content.

872. Schuphan, W. 635.13:581.192:575
Biochemische Sortenprüfung an Gartenmöhren als neuzeitliche Grundlage für planvolle Züchtungsarbeit. (**Biochemical variety tests on garden carrots as a modern basis for planned breeding work**).
Züchter 1942 : **14** : 25–43.

Wide varietal differences were found in dry matter, carotin and protein nitrogen contents. The highest dry matter content was found in the varieties Sudenburger, Gosenheimer and Lange rote stumpfe ohne Herz [Long, red, stump rooted, coreless], late varieties tending to show higher values than early varieties. There was no correlation between dry matter content and sugar content, some varieties with the highest dry matter being the lowest of all

in sugar. By far the highest carotin content among the late varieties was found in Lange rote stumpfe ohne Herz, the lowest in Rote Riesen. Early varieties, especially when grown late in the open, had distinctly higher carotin contents, the highest value being found in the varieties Amsterdamer Treib [Amsterdam Greenhouse] and Gonsenheimer Treib; both these varieties exceed Rote Riesen by about 48%. An especially promising variety is Erstling, which contains 11·30 mg.% carotin on fresh weight, is very early, yields well and is suitable for either field or greenhouse. Such early varieties are recommended for field cropping where high carotin is required, in spite of the fact that they yield less than late varieties. Wild carrots contained very little carotin, whilst a new selection named Neuzüchtung X contained 14·17 mg.%, which is much higher than any other late variety.

Protein nitrogen was somewhat higher in late varieties than early. Total sugar content was highest in Erstling, with 5·23% on fresh weight, while Amsterdamer Treib had the highest disaccharide content.

The woody core was found to be lower in carotin content than the outer layers, but the difference was not equally pronounced in all varieties; the varieties Amsterdamer Treib, and Erstling, Marktgärtner and Neuzüchtung X have an unusually high content in the woody part, a character of considerable importance in breeding.

Yield of carotin per hectare was highest in Amsterdamer Treib in the early group (2·766 kg.), in Erstling in the mid-early group (4·1 kg.) and in Lange rote stumpfe ohne Herz in the autumn group with 7·1 kg. It is calculated that for each hectare planted with the last named variety the excess carotin yield over that from an inferior variety such as Duwiker is sufficient to meet a day's carotin requirement of nearly a million men. The variety Lange rote is also the best as regards yield of mono- and disaccharides and protein nitrogen per hectare.

The intensity of coloration of the root was found to be no index of the actual carotin content, which must be determined analytically.

873. COULTER, F. C. 635.52:576.16
Story of garden vegetables. IX: Lettuce, the queen of salad plants.
Seed World 1942 : **51** : No. 3 : 16–19.

Early references to lettuce and its varieties, the first dating from Egyptian times, are cited.

874. 635.52:581.6:575(74.8)
Celtuce—a new vegetable for '42.
Seed World 1941 : **50** : No. 9 : p. 22.

A description is given of a new form of lettuce which produces, as well as edible leaves, an edible stalk to be eaten like celery or asparagus. It has been developed by Burpee (W. Attee Burpee Co., Philadelphia) and is named Celtuce. The origin is not given.

875. ROUX. 635.54:575
Ein Beitrag zur Erhöhung des Anbauerfolges der Treibzichorie. (**A contribution towards increasing the value of forcing chicory**).
Gartenbauwiss. 1941 : **15** : 559–64.

The author sets out to discover which form of root is most suitable for forcing and what improvements could be made by breeding. The conclusion is reached that as the size of the root increases so, up to a certain point, does the size of the shoot. If larger roots are chosen, there is apt to be a tendency to produce numbers of small and worthless shoots. The most suitable size of root is one measuring 4–5 cm. R. M. I.

876. KASPAROVA, S. 635.54–2.4–1.521.6
(**Resistance of chicory**).
Bull. Acad. Sci. U.R.S.S., Sér. Biol. 1941 : No. 3 : 353–70.

The experiments have shown that the growing chicory root contains certain "antibiotic" substances that enable it to resist infection by fungous parasites such as *Sclerotinia sclerotiorum*. These are most active in the early stages of growth and gradually diminish in activity and during storage the roots become much less resistant; the loss of resistance was less in one of the two varieties tested than in the other. The more resistant variety also had a higher sugar content during storage.

Antibios is not the only factor concerned in resistance, which seems to be conditioned by a complex series of processes. For instance, the rate of wound healing and of callus formation is greater at the beginning than the end of storage.

877. IVANOFF, S. S. 635.611–2.411.4–1.521.6:575
Breeding cantaloupes for resistance to downy mildew and other diseases and pests.
Phytopathology 1942 : **32** : p. 10. (Abst.).

In breeding transportable cantaloupes resistant to downy mildew (*Peronoplasmopara cubensis*) resistance has been brought in from selected inbred lines of Cuban Castilian and Rocky Dew and transportability from Arizona Nugget, Seed Breeders and Powdery Mildew Resistant California 45. Some lines in F_4, F_5 and F_6 combine transportability with some degree of resistance to downy mildew, powdery mildew (*Erysiphe cichoracearum*) melon aphid (*Aphis gossypii*) and larvae of *Diaphania* spp.

878. SOMERS, L. A. 635.615:575
To save an industry. Keep your eyes open for a new type watermelon plant.
Market Gr. J. 1942 : **70** : 84–85.

There is need for a variety of *Citrullus vulgaris* with short internodes and a shorter growing period combined with resistance to *Fusarium* wilt and good texture of the melons.

879. WELCH, A. and MELHUS, I. E. 635.615–2.484–1.521.6:575.11
Wilt resistance in F_1 hybrid watermelons.
Phytopathology 1942 : **32** : 181–82.

An inbred selection from the variety Dixie Queen, susceptible to *Fusarium bulbigenum* Cke. and Mass. var. *niveum* (EFS) Wr., was crossed in 1937 with a wilt resistant inbred selection from (Iowa Belle x Jugoslavia 7, backcrossed on Iowa Belle). The F_1 plants were 70–85% resistant. The same was found in the F_1 plants of the crosses Japan 7 x Thurmond Grey and Japan 7 x Dixie Queen. In other crosses the F_1 was susceptible.

880. JENKINS, J. M. (jun.) 635.63–2.411.4–1.521.6:575
Downy mildew resistance in cucumbers.
J. Hered. 1942 : **33** : 35–38.

It was considered that the development of commercial varieties of *Cucumis* species with resistance to *Peronoplasmopara cubensis* might offer a cheaper and more reliable method of control of the disease than the use of fungicides.
Tests made at the South Carolina Truck Experiment Station have shown that only China and Puerto Rico No. 37 are highly resistant but that commercially desirable types of cucumbers may be isolated by crossing these with good commercial varieties such as Colorado.

881. HARDIN, M. 635.64:575(76.6)
Breeding drought-resistant tomatoes.
Market Gr. J. 1942 : **70** : p. 129.

The behaviour of two new varieties of *Lycopersicon esculentum*, Redwin No. 201 and Pinkhoma No. 202, under dry conditions of the Oklahoma Panhandle is recorded. The varieties are outstanding in yield and smoothness of fruit.

882. POWERS, L. 635.64:575–181
The nature of the series of environmental variances and the estimation of the genetic variances and the geometric means in crosses involving species of *Lycopersicon*.
Genetics 1942 : **27** : p. 162. (Abst.).

The weights of individual fruits were studied in the cross Danmark (*Lycopersicon esculentum*) x Red Currant (*L. pimpinellifolium*) (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 2). A method of separating that portion of the variance due to the segregation of the genes from that due to environmental influences is given. It was found that the data are in agreement with the hypothesis that the effects of the genes differentiating weight of fruit are geometrically cumulative.

883. HACKBARTH, J. 635.64:575.127.2
Dreijährige Ertragsprüfungen mit Tomaten-Zuchtstämmen aus Kreuzungen mit *Sol. racemigerum*. (**Three years' yield tests with tomato selections from crosses with *S. racemigerum*).**
Gartenbauwiss. 1940 : **15** : 36–47.

The progeny of crosses between *S. racemigerum* and the cultivated varieties, Bonner Beste and Kondine Red, were studied in the F_6–F_8. The results showed that by simple selection it was possible to obtain useful varieties with improved qualities as compared with the cultivated varieties. Back-crossing is suggested for further improvements.
A normal sized fruit has not yet been obtained among the progeny, as obviously this depends on a number of genes and size can be improved by limiting the number of fruits.
The yield of the cultivated varieties was in many cases surpassed by the progeny. The simplest explanation of this is that special genes are needed for number of fruits and these are furnished by *S. racemigerum*.
The early ripening of *S. racemigerum* was not retained and there is a possible linkage between fruit size and early ripening as all the early ripening strains had very small fruits and were discarded. However, strains ripening 4–5 days earlier were obtained from the cross with Bonner Beste.
The non-splitting character, due to thicker skin, of *S. racemigerum* is readily transferred to all the progeny. R. M. I.

884. 635.64:581.6:575.127.2
SENGBUSCH, R. v. 635.64–2.111–1.521.6:575
Tomatenzüchtung. Frostwiderstandsfähigkeit, Lagerfähigkeit, Hochglanz der Fruchtschale und Zwergformen. (**Tomato breeding. Frost resistance, keeping capacity, glossiness of skin and dwarf forms**).
Pflanzenbau 1940 : **17** : 143–52.

The author has worked on the progeny of crosses between *Solanum racemigerum* and cultivated varieties but since 1937 has been unable to obtain the necessary material. The following observations were made on work done before 1937.
Plants were grown in rows on a slope showing a difference of 4–5° C in temperature between the lowest and highest points. No great difference in frost resistance was observed between the wild and cultivated varieties.
With regard to storage, the fruits were kept in peat at a temperature of 0° C. The difference between strains and varieties was too slight to allow any hope of finding any plants suitable for breeding a strain more resistant to storage. In 1936, among plants left to ripen in the open, it was observed that while the fruits of the variety Bonner Beste fell from the plant and were soft and split, those from strains 806 and 1646 remained on the plants, unsplit, fresh and firm. Some of the fruit remained two months on the plants in spite of the weather.
There appear to be three essentials for satisfactory storage; non-splitting of the fruits, firm attachment to the plant and resistance of the skin to the entry of disease organisms.
It is noted that among the progeny of a cross with *S. racemigerum* was a strain with very shiny skin.
Dwarf plants of tomato, also from a cross with *S. racemigerum* and suitable as ornamental plants are described. R. M. I.

885. YOUNG, P. A. 635.64–2–1.521.6:575.11
Wilt-resistant tomatoes with new genetic characters.
Phytopathology 1942 : **32** : p. 24. (Abst.).

Very brief notes are given on some new genetic characters in tomatoes, which, the title suggests, are wilt resistant.

886. YOUNG, P. A. 635.64–2.19–1.521.6
Varietal resistance to blossom-end rot in tomatoes.
Phytopathology 1942 : **32** : 214–20.

This disease in *Lycopersicon esculentum* is physiological, attributable probably to a varietal weakness. The relative resistance of numerous varieties is recorded.

887. 635.64–2.482–1.521.6:575.127.2
LOCKE, S. B. 635.64–2.484–1.521.6:575.127.2
Resistance in South American *Lycopersicon* species to early blight and *Septoria* blight.
Phytopathology 1942 : **32** : p. 12. (Abst.).

By laboratory tests *L. hirsutum* has been found to be resistant to *Septoria* blight (*S. lycopersici*) and to early blight (*Alternaria solani*). F_1 *L. esculentum* x *L. hirsutum* hybrids were as resistant to *Septoria* as *L. hirsutum*, but intermediate with respect to *Alternaria*. From a back-cross to *L. esculentum* indications of a single factor for *Septoria* resistance were obtained.

888. BLOOD, L. H. 635.64–2.484–1.521.6:575
Scientists seek tomato varieties resistant to *Verticillium* wilt. Reduction of tomato diseases important in program of increased production.
Fm & Home Sci. 1941 : **2** : No. 4 : 5, 8.

Two tomato strains, *L. esculentum* Peru Wild No. 665 and a strain of *L. pimpinellifolium*, both of which came from the Urubamba valley in southern Peru, were found to possess a very high degree of resistance to *Verticillium* wilt. Promising selections have been made from crosses between commercial varieties and Peru Wild No. 665.

889. PORTE, W. S. and
WELLMAN, F. L. 635.64–2.484–1.521.6:575
Development of interspecific tomato hybrids of horticultural value and highly resistant to Fusarium wilt.
Circ. U.S. Dep. Agric. 1941 : No. 584 : Pp. 19.

Details are given of the selection of virulent strains of the tomato-wilt *Fusarium*, of the production of a uniformly infested field for testing disease resistance and of the greenhouse method of determining disease resistance. Tomato parents were inbred to obtain uniform lines. P.I. 79532, a strain of *Lycopersicon pimpinellifolium* from Peru, was found to possess very high resistance to *Fusarium*. It has been crossed with Marglobe (a resistant variety) and this cross has been selected and back-crossed with Marglobe in an attempt to obtain highly resistant commercial varieties. A number of lines of horticulturally acceptable and highly wilt-resistant tomatoes have been obtained and they are being further selected.

890. BRUMFIELD, R. T. 635.651:581.43:576.356.2:537.531
Cell-lineage studies in root meristems by means of X-ray induced chromosome rearrangements.
Genetics 1942 : **27** : p. 135. (Abst.).

It is pointed out that the chromosome changes induced by X-rays offer a means of "tagging" a single cell and determining the kind and extent of tissues derived from it. Such studies were made with the root tip meristems of *Vicia Faba* and *Crepis capillaris* and the results suggest that in these roots a single cell may give rise to root cap, epidermis, cortex, endodermis and central vascular cylinder.

891. JENSEN, J. H. and
GOSS, R. W. 635.652–2.3–1.521.6:575
Physiological resistance to halo blight in beans.
Phytopathology 1942 : **32** : 246–53.

The behaviour of varieties of *Phaseolus vulgaris* in which small necrotic lesions occur instead of the large typical halo lesions attributed to *Pseudomonas medicaginis* var. *phaseolicola* has been studied. Two varieties, namely, Red Mexican and Schwert, Hamburger Markt (Stapp 27, F.P.I. 112,769), [referred to as Schwert 27] were studied for their reaction to halo blight infection under various conditions and with different types of inoculation in comparison with two susceptible varieties.
The breeding trials recorded indicate that probably resistance to halo blight can be combined with desirable horticultural characters, although back-crossing may be necessary to produce varieties of commercial value. Work on this aspect is in progress.

892. HIORTH, G. 635.652:633.4:575(43)
Eiweissreiche Wurzelknollen bei niedrigen Feuerbohnen. (**Tuberous roots rich in protein in dwarf scarlet runners**).
Züchter 1942 : **14** : 43–47.

A tendency to the formation of swollen, tuberous roots in *Phaseolus multiflorus* is thought to be a relic of the perennial habit which was originally characteristic of the species. Crosses were made between a sample of dwarf runners and a number of common tall varieties. All tall F_2 plants were eliminated and the remaining dwarf plants, some 2000-3000 in number, were examined for root character; some 250 with tuberous roots were selected. The thickening took a variety of different forms, as is shown by illustrations of the different types, some of which resemble a turnip, others a beet or carrot; some attained a thickness of up to 6 cm. and a weight of 2·2 kg. of tubers was obtained from 10 plants, the best plant of all having yielded 325 grm. of tubers. The plants with the best tubers had a much reduced seed yield.
The tubers from a number of plants were analysed and gave an average crude protein content of 4·2%; their dry matter content was very high, 31·3%, and this contained therefore 13·4% of protein. It is thought that by selection these figures could be still further increased.
In flavour the tubers resembled a potato and though rather woody are pronounced "quite pleasant".

893. PROBST, A. H. and
CARTTER, J. L. 635.655:575:578.08
A portable soybean nursery thresher and its operation.
J. Amer. Soc. Agron. 1941 : **33** : 673–75.

A portable nursery thresher constructed at Lafayette, Ind., in 1938 for breeding purposes is described and illustrated. It costs about $100 and weighs 300 lb.; blueprints can be obtained from the authors.

894. WEISS, M. G. 635.655:575:578.08
Field seed cleaner for soybeans.
J. Amer. Soc. Agron. 1941 : **33** : 849–50.

In threshing soya beans it has been found advantageous to construct the cleaning equipment separate from the thresher. A relatively simple type of cleaning device which has given excellent results during the past season with soya beans is described and illustrated. It was built at Ames, Iowa, by a machinist at an approximate cost of $30.00 exclusive of the blower.

895. 635.656:581.48:575.11
BUCHINGER, A. 635.656–2–1.521.6
Ein Beitrag zur Züchtung der Ackererbse (*Pisum arvense*). [**Contribution to field pea (*P. arvense*) breeding**].
Forschungsdienst 1941 : **12** : 298–309.

Three main seed types were found in a local Austrian pea; Type A had green seeds with brown patches and blue dots, Type B had green seeds with blue dots only and Type C green without either patches or dots. Seedlings of each type were selected for high osmotic pressure and grown separately. The progenies of type A survived the winter best, and those of type C the worst. Plants bearing seeds with a reddish tinge tended to be hardier than those bearing pure green seeds; they gave also a higher yield of green matter. Type A also exceeded the others in earliness, number of pods and number of seeds per plant, in seed weight and thus in seed yield. There was again a tendency for forms with reddish seeds to yield more than those with green. Type A was more resistant to *Bruchus pisi*.
Numerous instances of cross-pollination resulting in xenia are reported. Seeds of the A type occurring on B plants were heavier than those of the maternal type, those of the C type lighter. B type seeds borne on C plants were however also lighter than the maternal C type.
Complex ratios of the different types occurred in their respective progenies.

896. 635.67:575
COULTER, F. C. 633.15:575
The story of garden vegetables. VII: Sweet corn a distinctively American crop.
Seed World 1941 : **50** : No. 9 : 12–13.

A brief account of the history of sweet corn.

DARLINGTON, C. D. and
LA COUR, L. F. 578.6

The handling of chromosomes.

George Allen & Unwin, Ltd., London 1942: 8s. 6d. Pp. 165 : 9 tables, 16 pls., 7 figs.

This book has been written mainly for teachers and students in schools and universities but the authors also suggest that the fixation and staining techniques described "should not come amiss to workers in the many branches of research for which the handling of chromosomes has now become useful or perhaps even necessary". Many of the methods given will be familiar to those who have done only a little cytological work but even cytologists with considerable experience will probably find a few useful hints in the book. The following are among the more recent techniques described—the use of substitutes such as dioxan, butyl alcohol, tertiary butyl alcohol, iso-propyl alcohol or methylal paraffin oil in dehydration and infiltration for either ethyl alcohol and xylol or ethyl alcohol and chloroform; the use of acetin-orcein (see "Plant Breeding Abstracts", Vol. XII, Abst. 407) and lacmoid indicator (resorcin blue), both these being used in a similar way to iron-aceto-carmine; and the Feulgen staining technique. Incidentally it is now suggested that acetic-orcein should not be used for material stored in 70% alcohol.

The book contains a preface, twelve chapters, five appendices, a list of references and an index. It is illustrated by a number of text figures and sixteen excellent plates or chromosome preparations. These plates give a most satisfactory guarantee of the merits of the methods described. After an introductory chapter, the authors discuss equipment (this chapter includes a sensible account of the use of a microscope), living chromosomes, bulk fixation, smears and squashes, paraffin methods, staining and mounting, and special treatments (e.g. those for showing spiral structure). Chapter 9 is called "The control of mitosis" and contains very short and rather fragmentary accounts of the actions of X-rays, drugs and temperature treatments on mitosis. The next chapter—its title is "The control of fertilization" and its subheadings are pollen germination, tube division, pollen storage, the style, haploid plants, haploid animals—is also rather scrappy. Chapters 9 and 10 include at least two mis-statements. Chapter 11 gives a useful account of methods used in microphotography. Chapter 12—its title is "Describing the results"—is divided into three sections, interpretation and description. In the last section the authors set out certain rules to be observed in writing papers. No abstractor will disagree with their final advice to the would-be author—"In a word, pay attention to the reader if you wish him to pay attention to you". The first appendix deals with sources of material, the second with standard solutions, the third with schedules of treatment, the fourth with implements and the fifth with abbreviations. H. W. H.

CLAUSEN, J.,
KECK, D. D. and 582(78)
HIESEY, W. M. 576.12:576.356

Experimental studies on the nature of species. I. Effect of varied environments on western North American plants.

Carnegie Inst. Wash. Publ. No. 520, Washington D.C. 1940 : Pp. vii + 452. 155 figs.

This book is a partial account of a detailed taxonomic and cytogenetical study conducted over a considerable number of years. Numerous genera distributed in western North America, a region exhibiting extreme diversity of climate and topography, are dealt with, in particular *Potentilla*, *Horkelia*, *Zauschneria*, *Pentstemon*, *Achillea* and *Artemisia*. An attempt is made to classify the groups studied into ecotypes, ecospecies and coenospecies, on the principal basis of observations made on clone members in three gardens situated on a transect of California at elevations of 30, 1,400 and 3,050 metres, but also taking into account cytological observations and crossing experiments.

The apparent methods of evolution in the various groups studied are often widely different, and some interesting conclusions are reached. In the case of the *Potentilla glandulosa* group, for instance, differentiation appears to be entirely determined by gene mutation and recombination, without change in chromosome number, and the most important key characters distinguishing ecotypes appear to be dependent each upon a series of genes, and the characters are often genetically linked. Other sections of the same genus show, in contrast, extreme polyploidy.

The conclusion is reached that the occurrence of polyploidy almost inevitably changes the gene balance and enables the new type to fit into some new ecological niche and hence to invade new territory; but it is held that it is not at all a general rule that the polyploid should occupy, as has often been held, a more extreme habitat. In some of the groups studied the lowest chromosome numbers occur near the coast, in others in high mountains and in still others in the desert.

It is shown that some plants show considerably greater ability than others to undergo modification and to thrive in new environments; but that in all cases where clones were studied, even the most striking modifications did not affect the genetic nature of the plant even over a period of years, and the meristems immediately started to produce the normal plant type when a transfer was made back to the original environment.

At the end of the book there is a list of chromosome number determinations and also of new species, subspecies, combinations, etc., described in the text. S. E.

AGRESTI, O. R. 63:007

David Lubin. A study in practical idealism.

Univ. Calif. Press 1941 : 2nd Ed. $2.50 : Pp. xiii + 372 : 3 illus.

David Lubin started life in a Polish ghetto, was toughened in the rough and tumble life of the far-western United States of the later nineteenth century and became an international figure in agriculture, playing the leading part in the founding of the International Institute of Agriculture. His biography is of absorbing interest, whether considered purely as a life story or as a source for the student of agragrian economics and politics. It would, however, be improper to comment on his views in this journal; suffice it to say that he had a very distinctive philosophy and outlook and that those who know the International Institute mainly as a source of reviews and statistics might be surprised and certainly would be interested to know the ideals it was intended to serve. J. L. F.

633.1 : 581.6 : 578.08

Cereal laboratory methods with reference tables.

Amer. Ass. Cereal Chem., Lincoln, Nebraska 1941 : 4th ed. Pp. xii + 264. 14 figs, tables.

In this useful and authoritative compendium of cereal chemistry methods, now in its fourth edition, the methods described are grouped under the following headings: wheat and other whole grains; experimental milling; wheat flour, semolina and similar products; feeds and feeding stuffs; rye; malt; enzymatic, physico-chemical and bacteriological methods; baking methods; bread; experimental macaroni processing; macaroni products; fats and shortening materials; leavening agents; yeast foods, bleaching agents and flour improvers. The appendices give a glossary of cereal chemical terms, statistical principles and experimental errors, preparation and standardization of solutions, reference tables and moisture correction charts. For the great majority of the methods concise and specific directions are given. References to the original articles are given at the end of each chapter. A subject index is provided.

The value and importance of this laboratory manual and reference book is indicated by the number of editions which have appeared. It is worth the attention of cereal breeders, though of course their special problems are not given separate treatment. J. L. F.

NEW JOURNAL

The Indian Journal of Genetics and Plant Breeding.

The Indian Society of Genetics and Plant Breeding was founded in January, 1941. It is intended that their official publication, the Indian Journal of Genetics and Plant Breeding, should appear twice a year for the present (there will, however, be only one issue for 1941). The first number contains a short introductory article by W. Burns and five papers—"Hybrid vigour in rice (*Oryza sativa* L.)", "Genic analysis of rice. II. Chlorophyll deficiencies", "Colchicine-induced polyploidy in crop plants. II. Chilli (*Capsicum annuum* L.)", "A cytological study of sterility in *Sesamum orientale* L." (see Absts 679, 675, 706 and 707 in this issue of Plant Breeding Abstracts) and "Studies in the vernalization of Indian crop plants. I. Preliminary experiments on grain, wheat, chilli and soybean" by B. P. Pal and G. Suryanarayena Murty. The production of the journal is excellent. The business address is—the Treasurer, The Indian Society of Genetics and Plant Breeding, Imperial Agricultural Research Institute, New Delhi. (Two issues per year—subscription rate Rs. 15 per year in India and Rs. 16 per year for other countries, inclusive of postage.)

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